

1/53

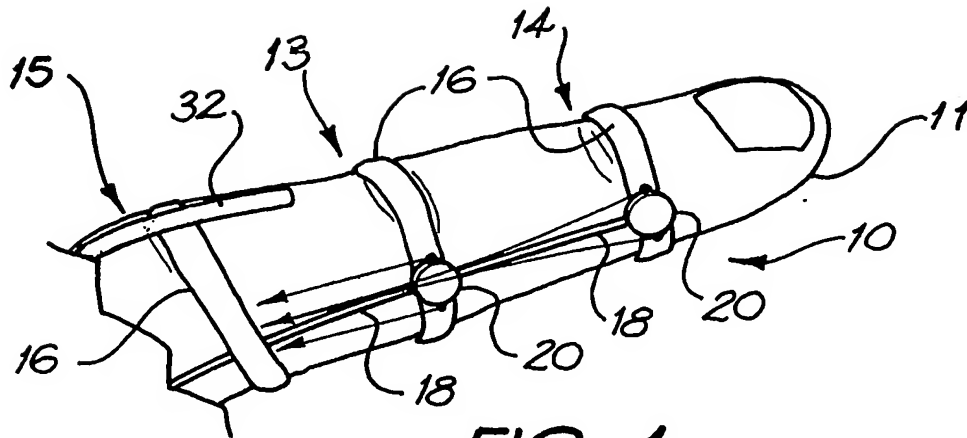


FIG. 1

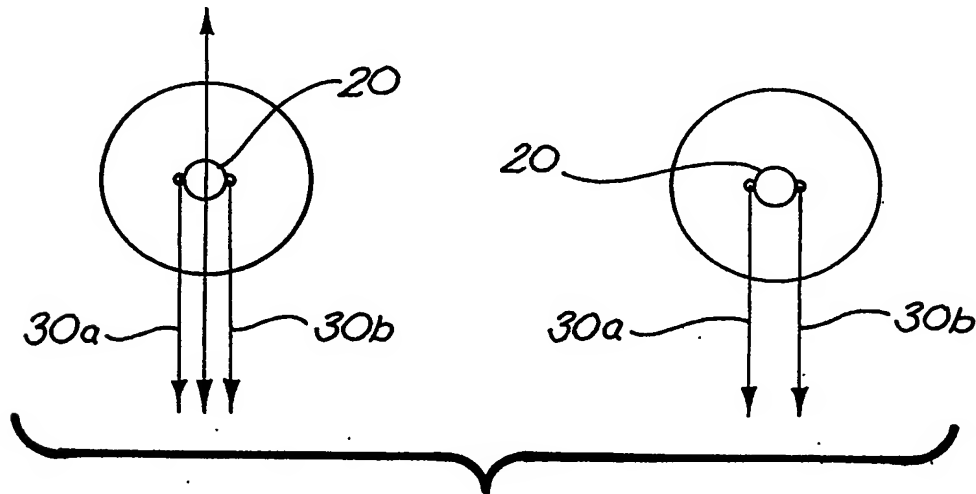


FIG. 2

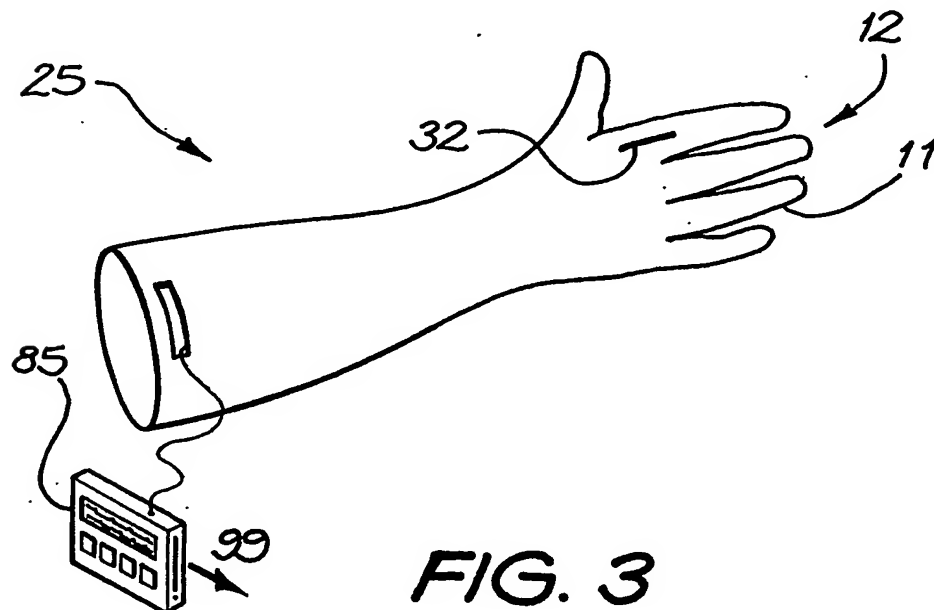


FIG. 3

2/53

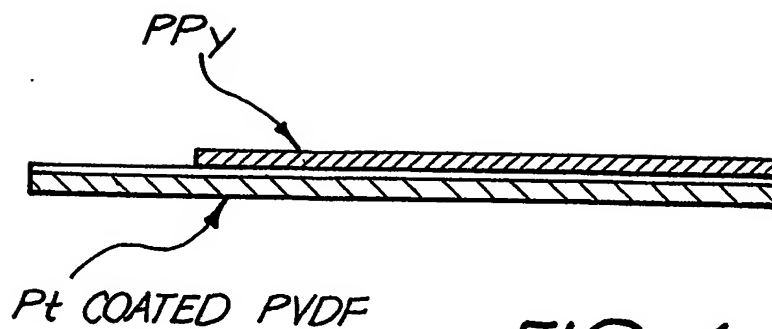


FIG. 4

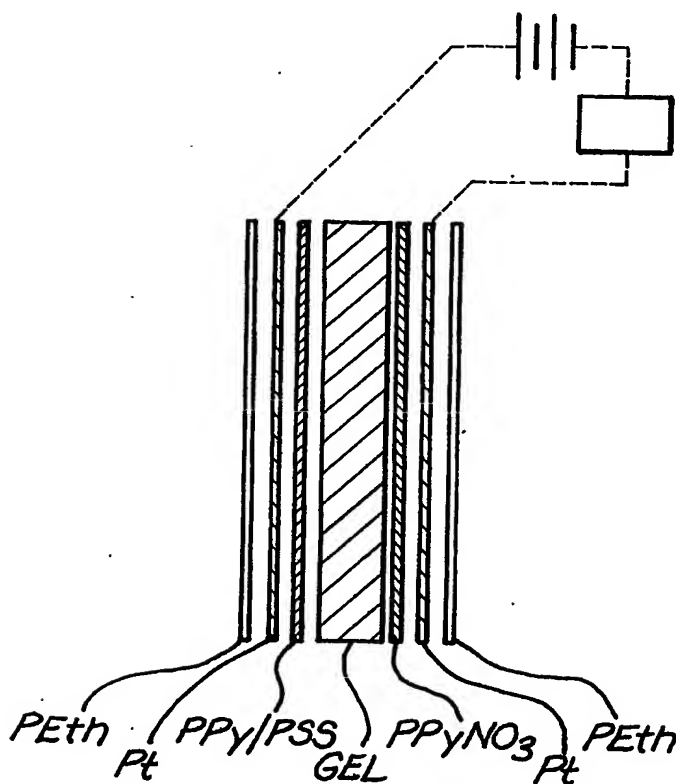


FIG. 5

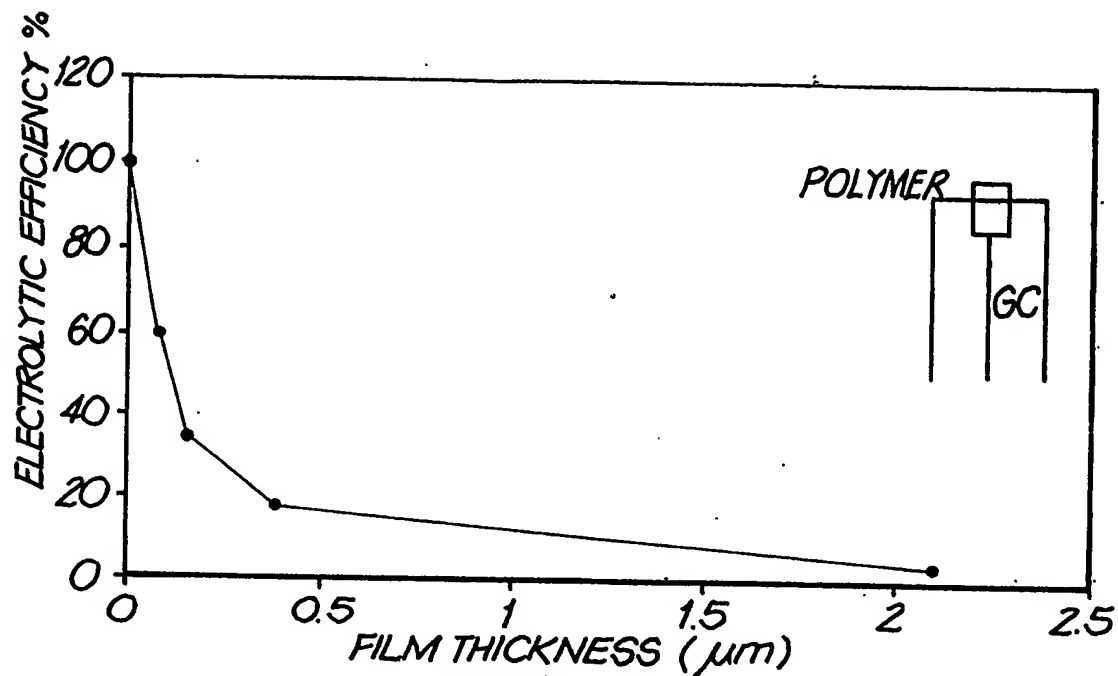


FIG. 6

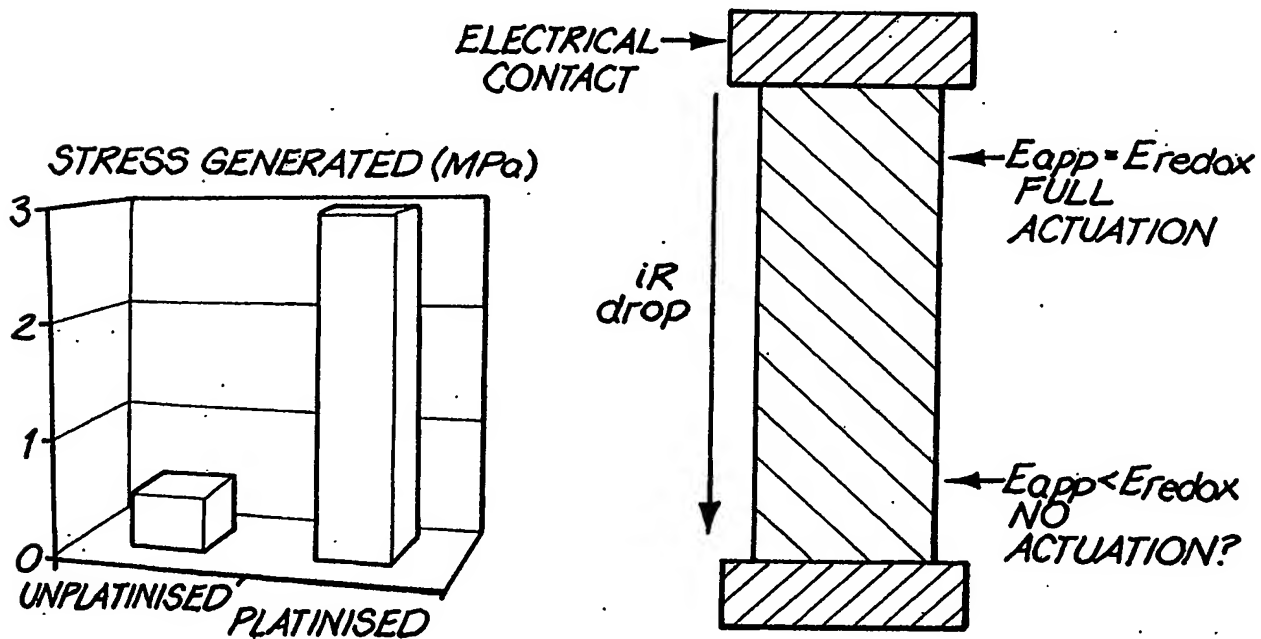


FIG. 7a

FIG. 7b

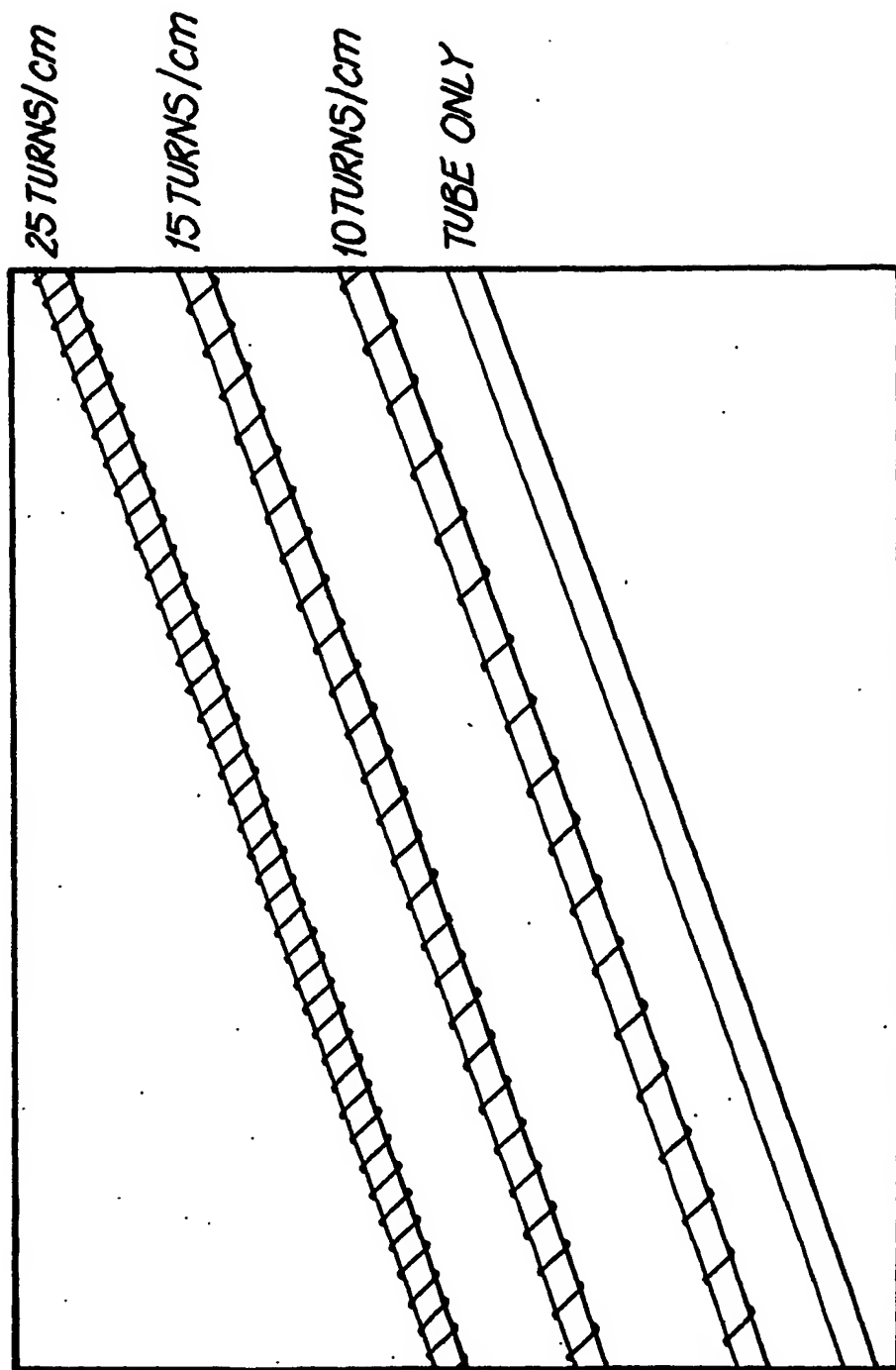


FIG. 8

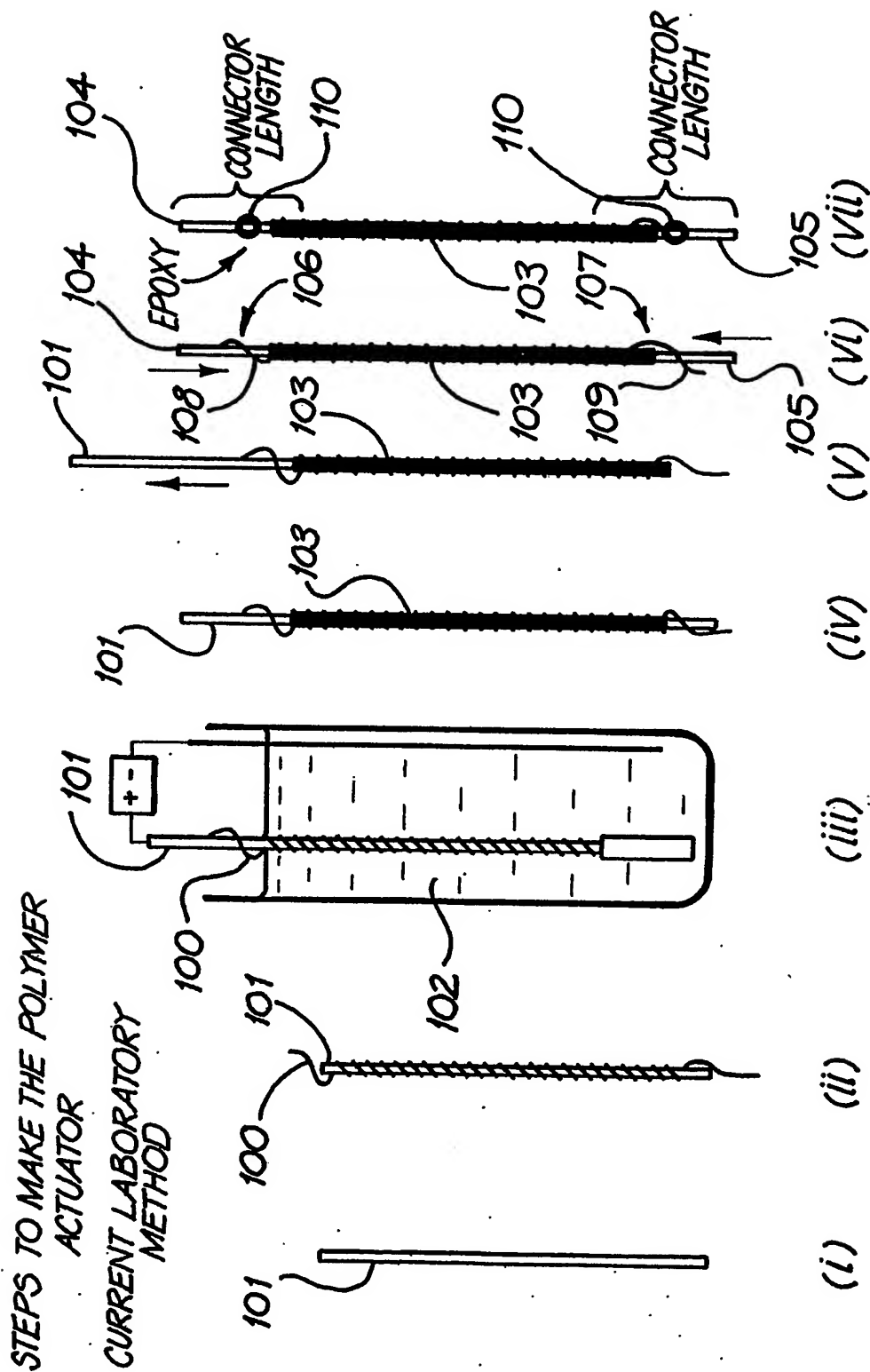
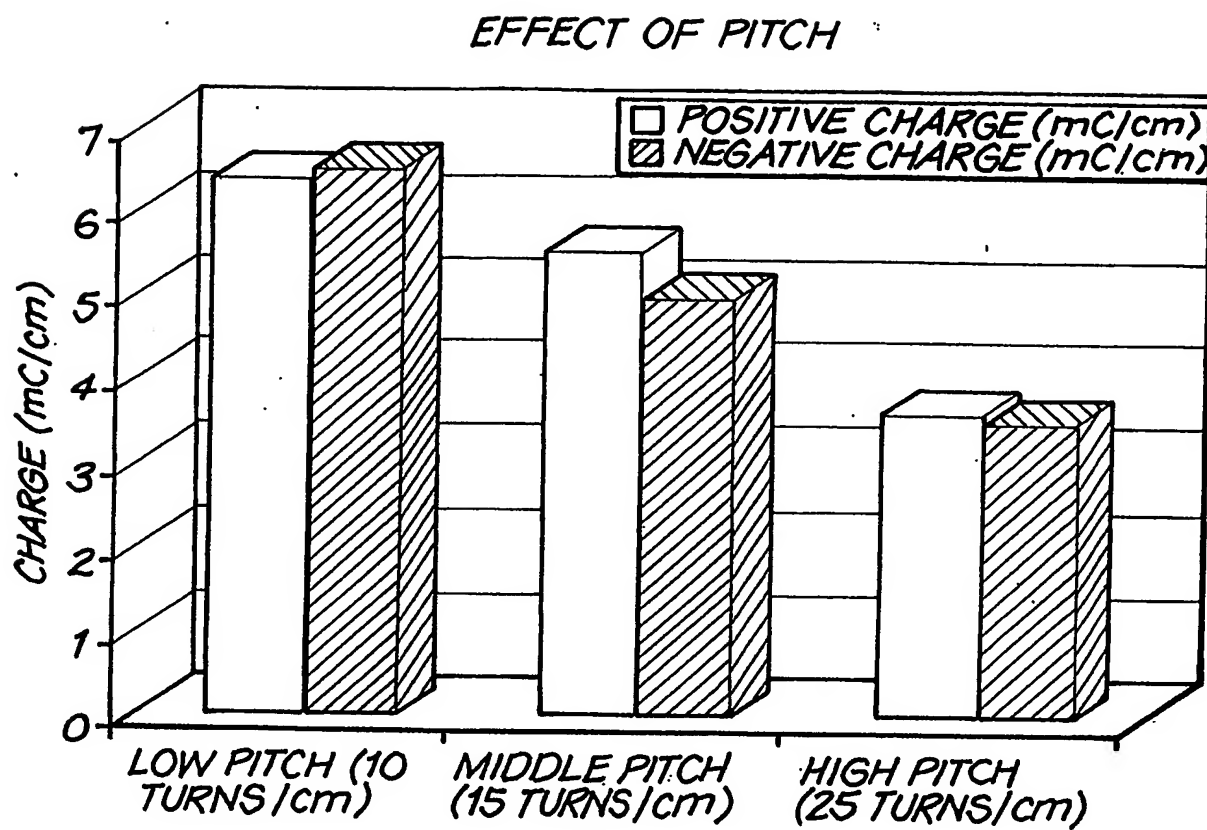


FIG. 9

6/53

*FIG. 10*

7/53

BASIC CIRCUIT DIAGRAM

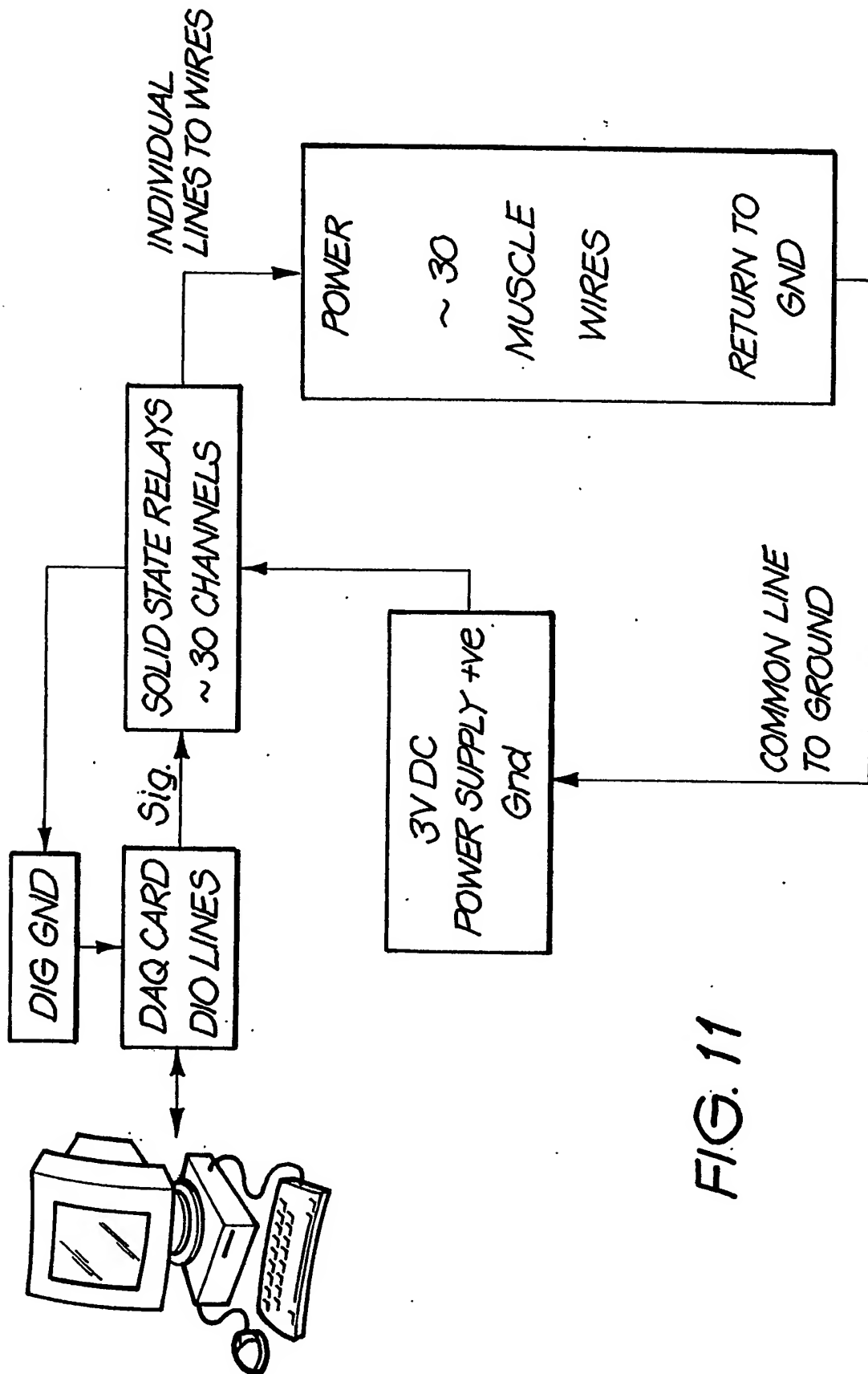


FIG. 11

PCI-MIO-16XE-50 IS DEVICE S
ON THE POWERMAC 9500
REMEMBER TO CHANGE THIS IF USING
THE PCI-DIO-96 OR ANOTHER COMPUTER

DIGITAL OUTPUT

device
↑ 5 ↓

digital channel
0

PCI-MIO-16XE-50 HAS ONE
DIO PORT OF 8 LINES. THIS PORT
IS REFERRED TO AS PORT 0.

HIT WHITE ARROW TO START &
EXIT AT ANY TIME TO FINISH

LINE PATTERNS FOR
EACH POSSIBLE STATE

NONE/FLEX/EXT

NONE
↑ 0 ↓

FLEX J1
↑ 1 ↓

EXT J1
↑ 10 ↓

PROGRAM STATUS


OFF

CURRENT FINGER POSITION

Flexion

WHICH WAY TO MOVE?

FLEXION CHO



MOVE

PULSE WIDTH MODULATION
☐ OFF / ON

ON TIME / PER SEC / DUTY CYCLE

TIME TO HOLD (SECS)
↑ 20 ↓

CYCLES PER SECOND
10

% ON
↑ 50 ↓

EXIT

FIG. 12

9/53

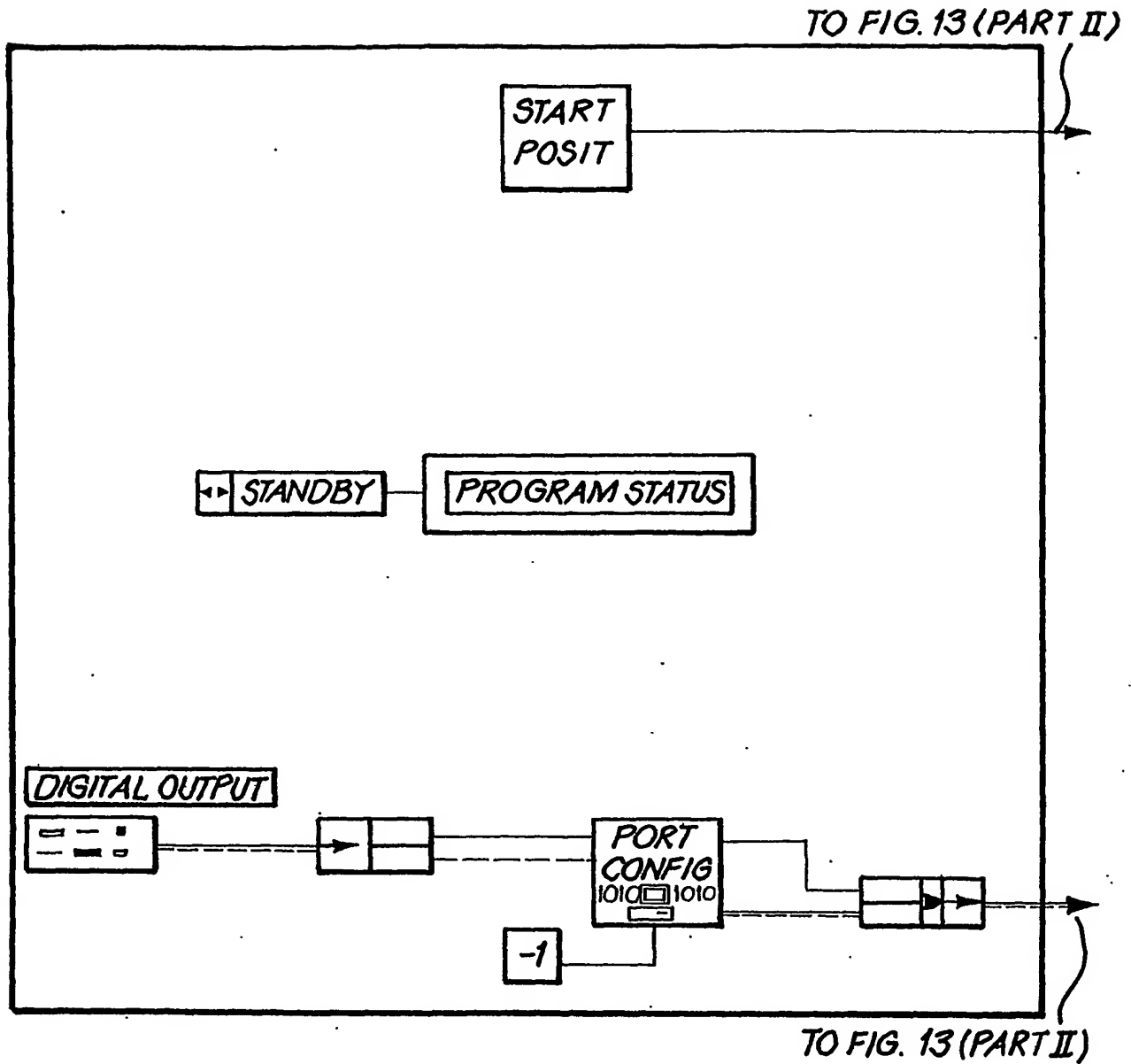
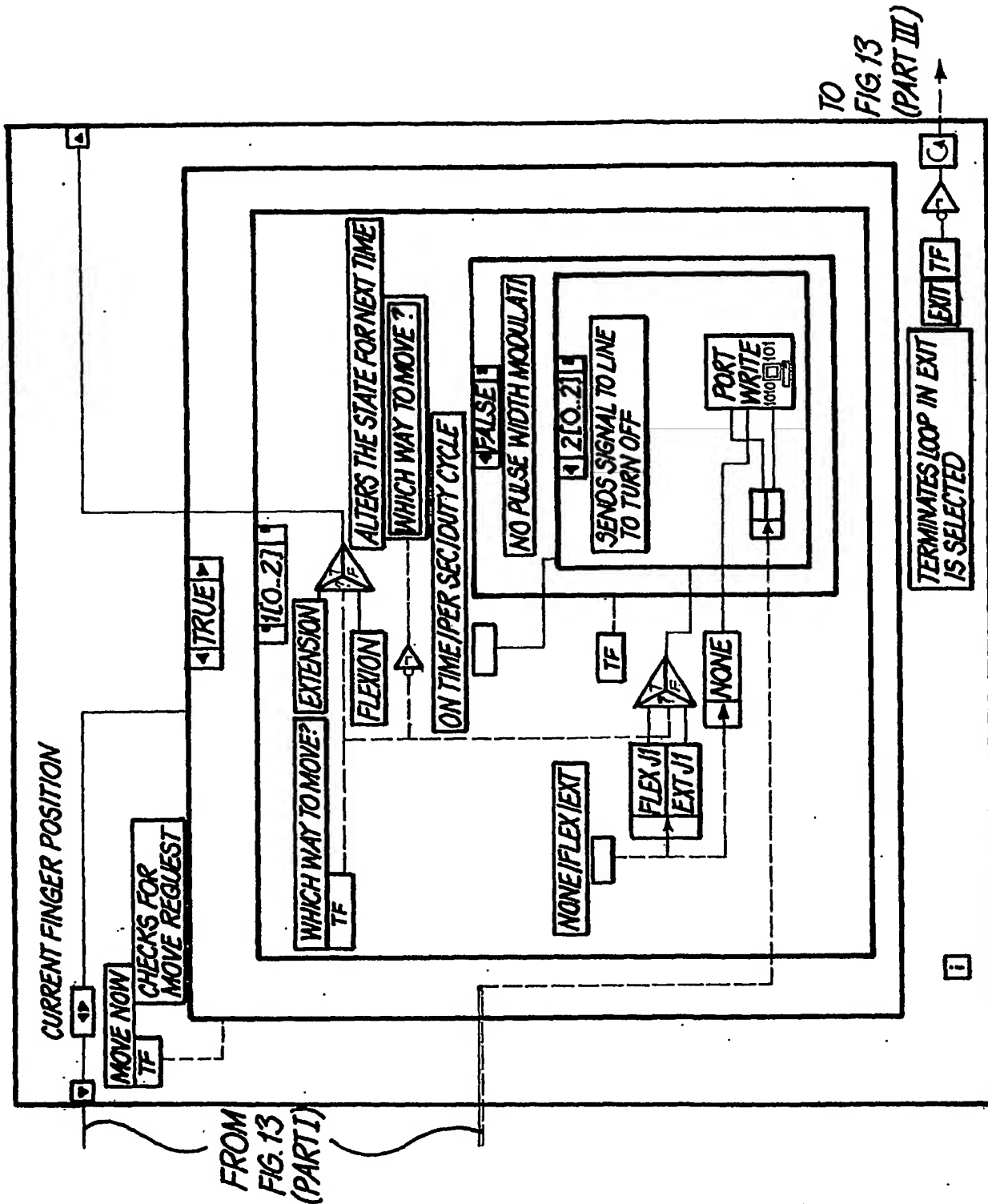


FIG. 13
(PART I)

10/53



11/53

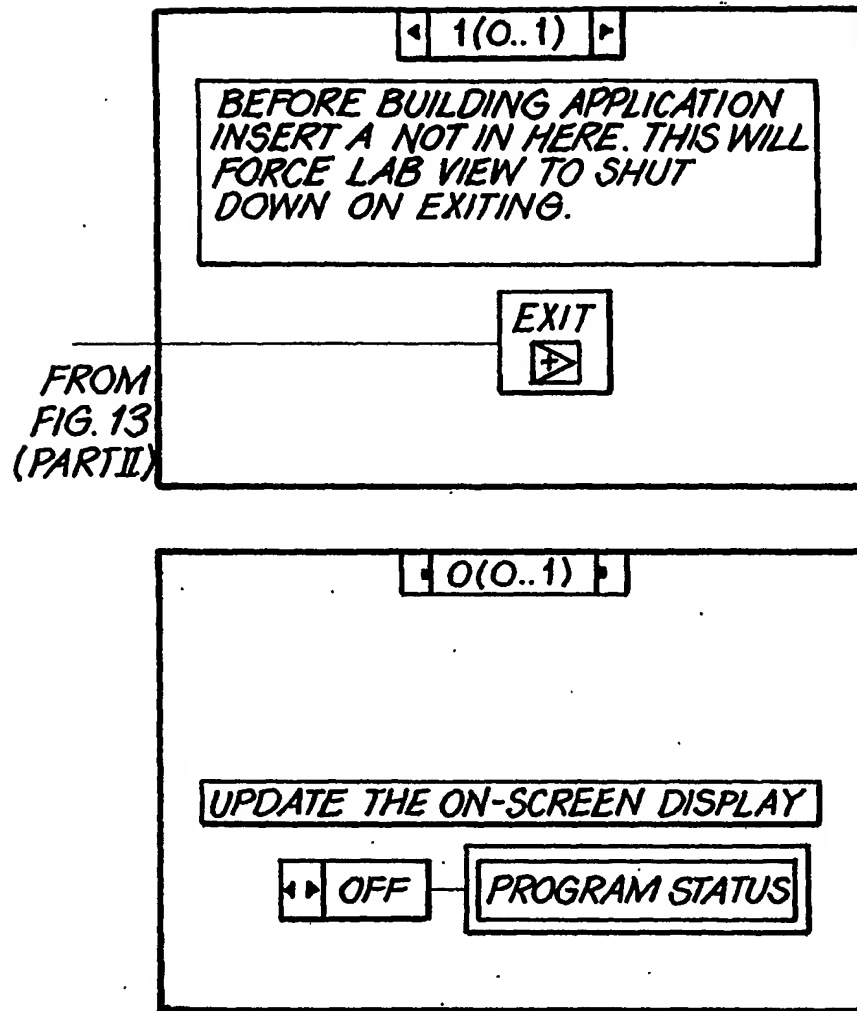


FIG. 13
(PART III)

12/53

↓ FROM FIG. 13 (PART II)

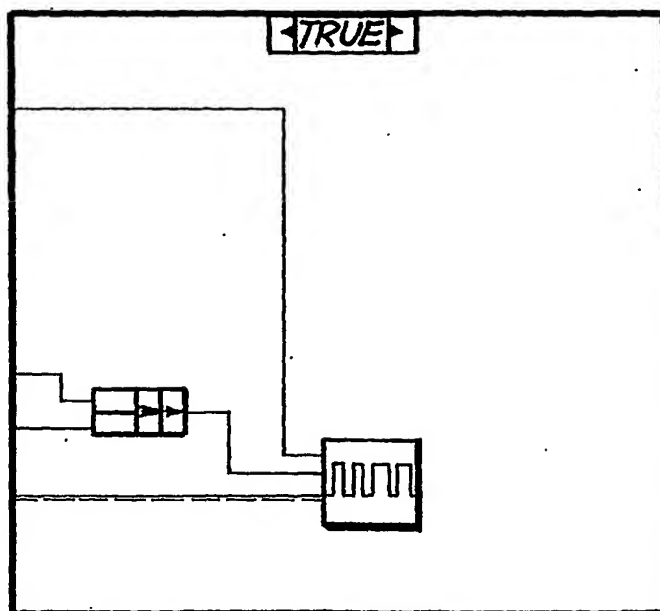
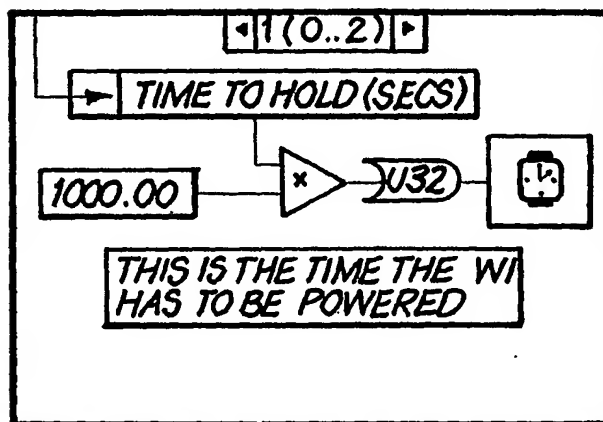
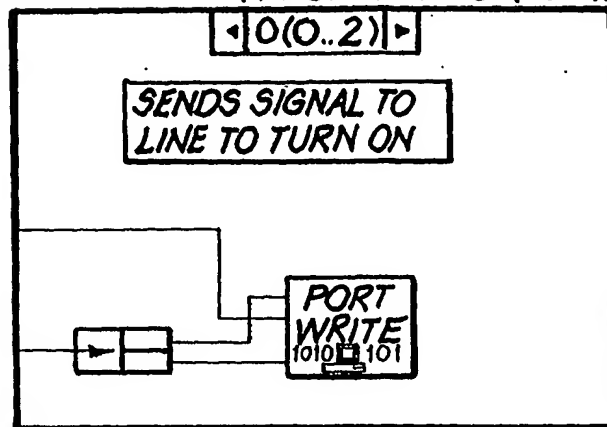
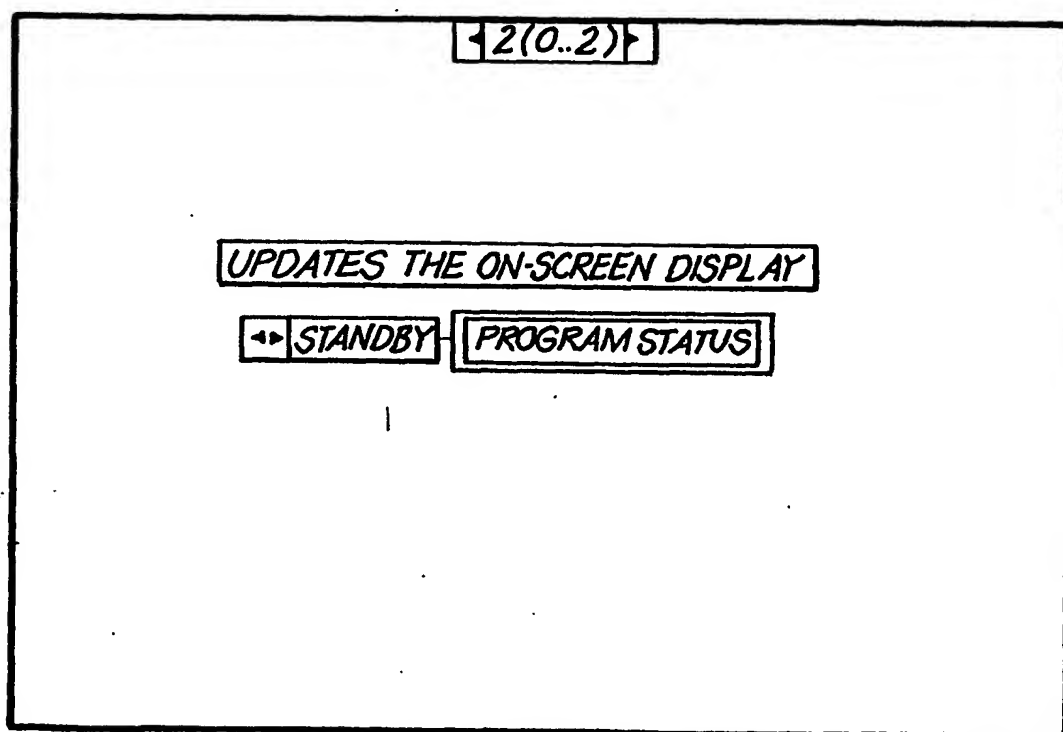
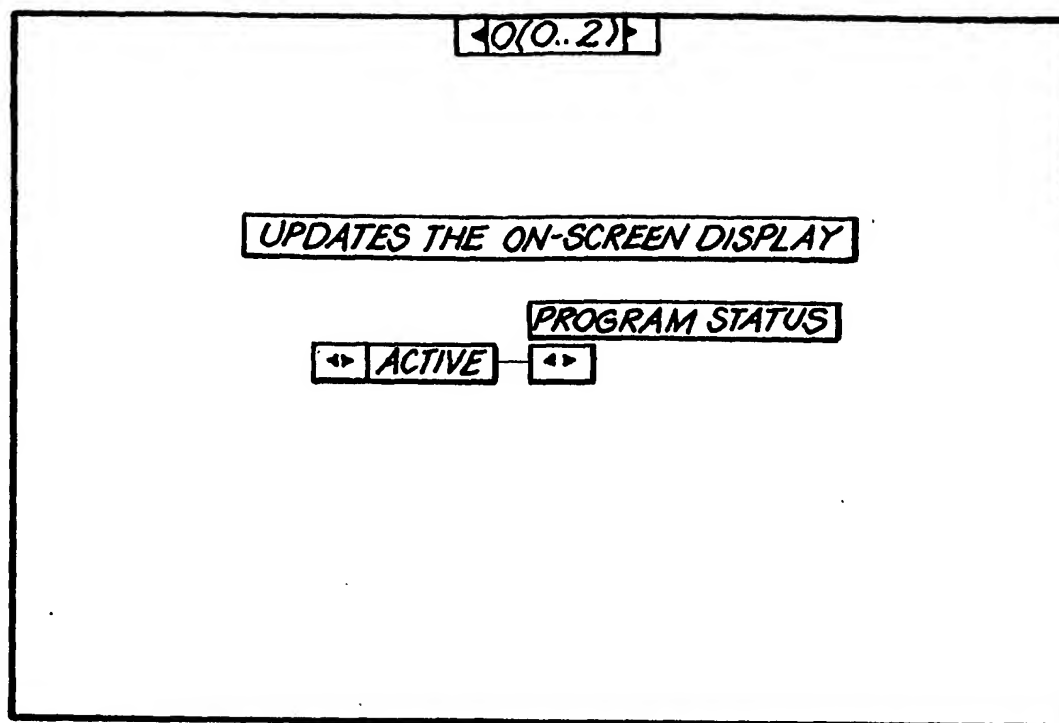


FIG. 13 (PART IV)

13/53



↓ TO FIG. 14 (PART II)

FIG. 14
(PART I)

14/53

↓ FROM FIG. 14 (PART I)

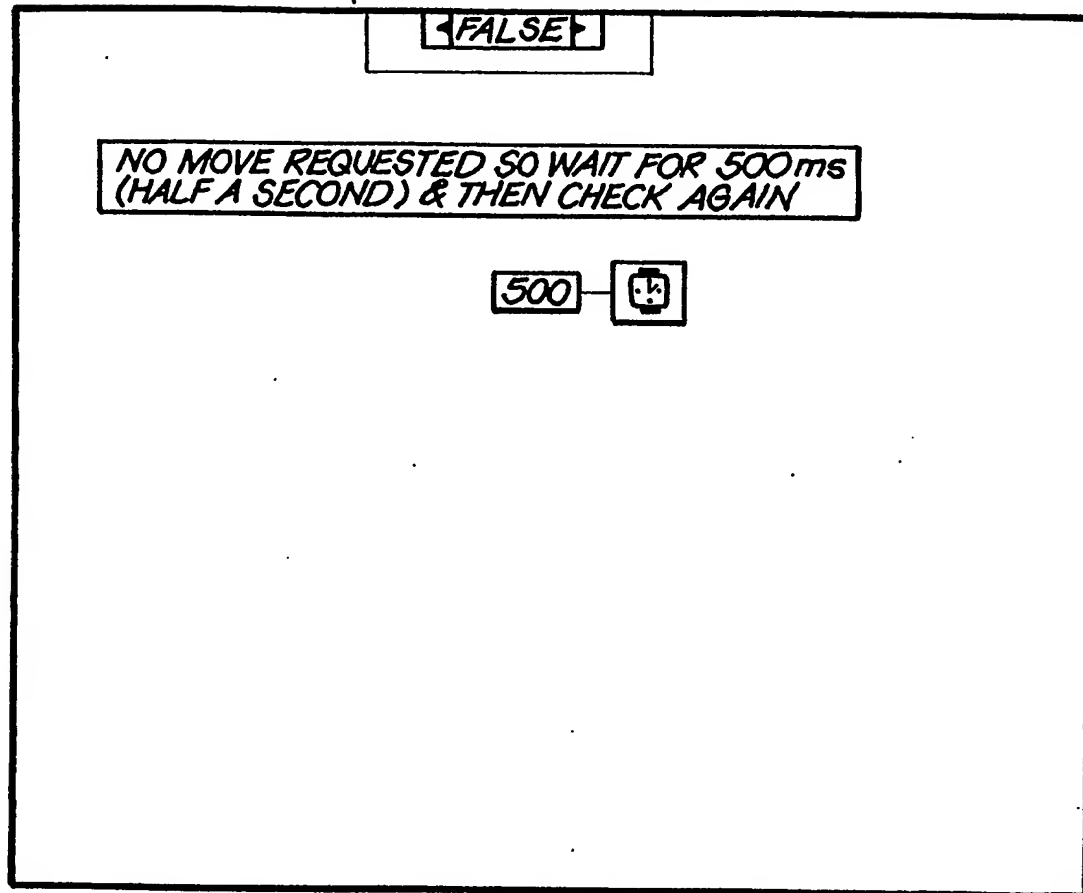


FIG. 14
(PART II)

DEVICE 5 IS PCI-MIO-16XE-50 ON POWERMAC 3500 AND DAQCARD-A1-16E-4 ON POWERBOOK G3 REMEMBER TO CHANGE THIS IF USING THE PCI-DIO-96 OR ANOTHER COMPUTER

DIGITAL OUTPUT

device

5

digital channel

0

PCI-MIO-16XE-50 HAS ONE DIO PORT OF 8 LINES. THIS PORT IS REFERRED TO AS CHANNEL 0.

HIT WHITE ARROW TO START AN EXIT AT ANY TIME TO FINISH

PROGRAM STATUS

OFF

CURRENT FINGER POSITION

Flexion

WHICH WAY TO MOVE?

EXTENSION | FLEXION

ORDER OF MOVEMENT

PROXIMAL + DISTAL | DISTAL → PROXIMAL

WHICH JOINTS TO

J1 ☒ J2 ☐ J3 ☐

MOVE

EXIT

LINE PATTERNS FOR EACH STATE: EXTENSION LINES 0 & 2 & 4. FLEXION LINES 1 & 3 & 5

NONE	↕ 0
EXT 11	↕ 1
FLEX 11	↕ 10
EXT 12	↕ 100
FLEX 12	↕ 1000
EXT 13	↕ 10000
FLEX 13	↕ 100000

PULSE WIDTH MODULATION (PWM) ☒ OFF / ON

ON TIME / PER SECOND CYCLE

TIME TO POWER (secs)

↕ 20

CYCLES PER SECOND

10 ▼

% ON

50

LED CLUSTER (NO PWM)

EXTENSIONS	OFF	6	OFF	4	OFF	2	OFF	0
FLEXIONS	OFF	7	OFF	5	OFF	3	OFF	1

"WHICH WAY TO MOVE?" AND "WHICH JOINTS?" ARE USED TO SELECT A PATTERN OF ACTIVATION.
"ORDER OF MOVEMENT" IS NOT YET IMPLEMENTED.
NOTE: TIMING IS THE SAME FOR ALL WIRES. "TIME TO POWER" MAY NEED CHANGING WHEN ACTIVATING INSULATED AND NON-INSULATED WIRES.

FIG. 15

16/53

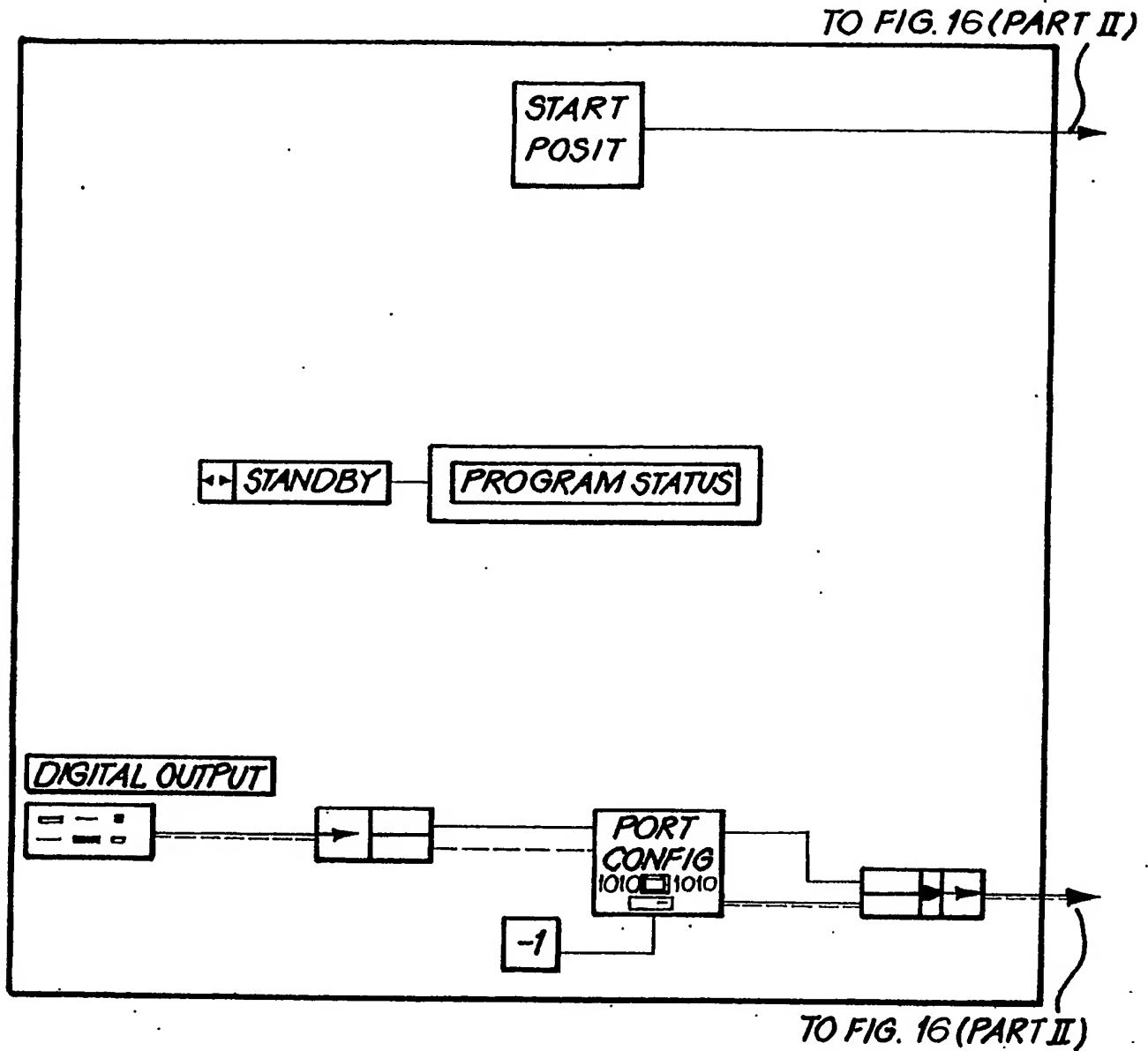


FIG. 16
(PART I)

17/53

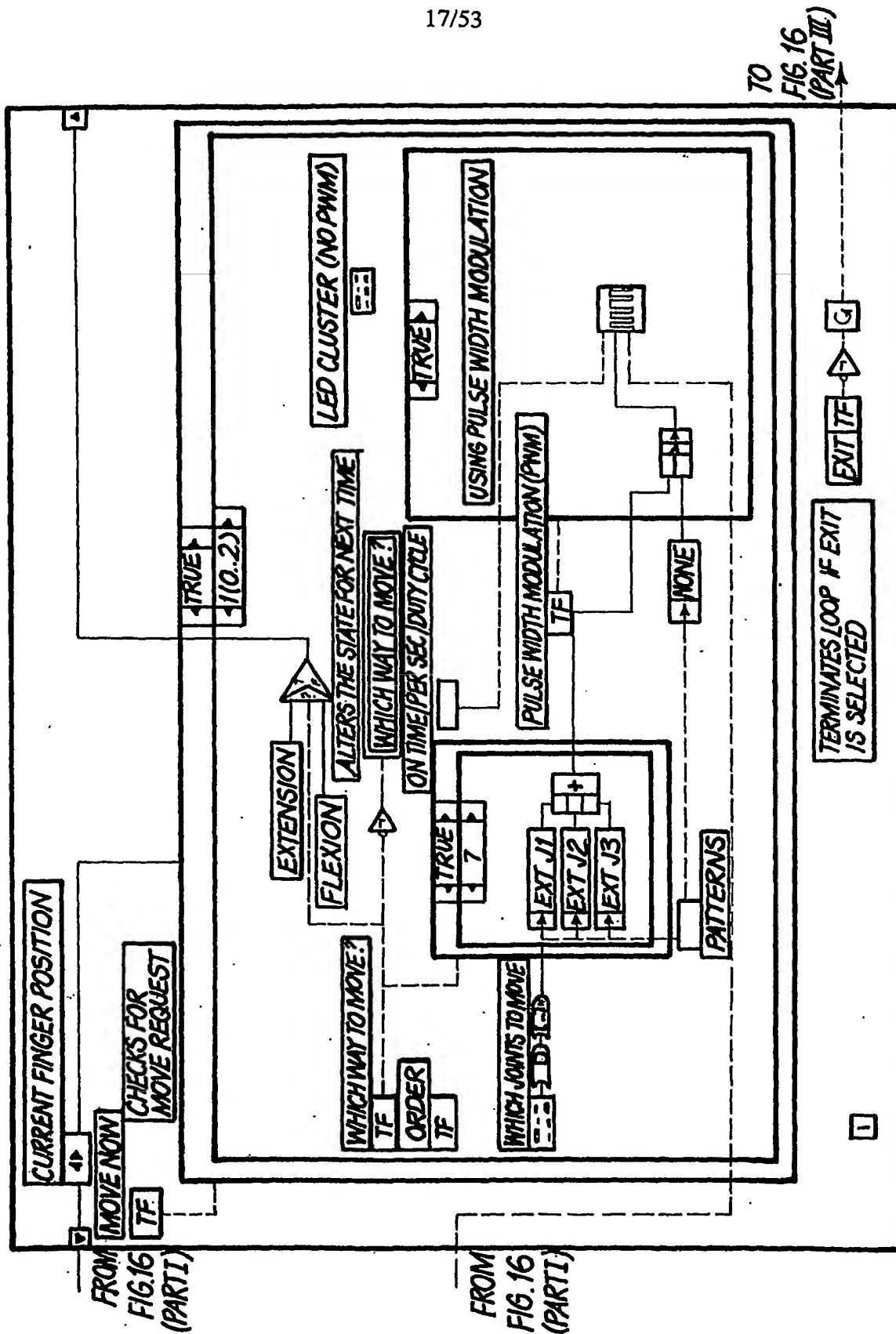


FIG. 16 (PART II)

18/53

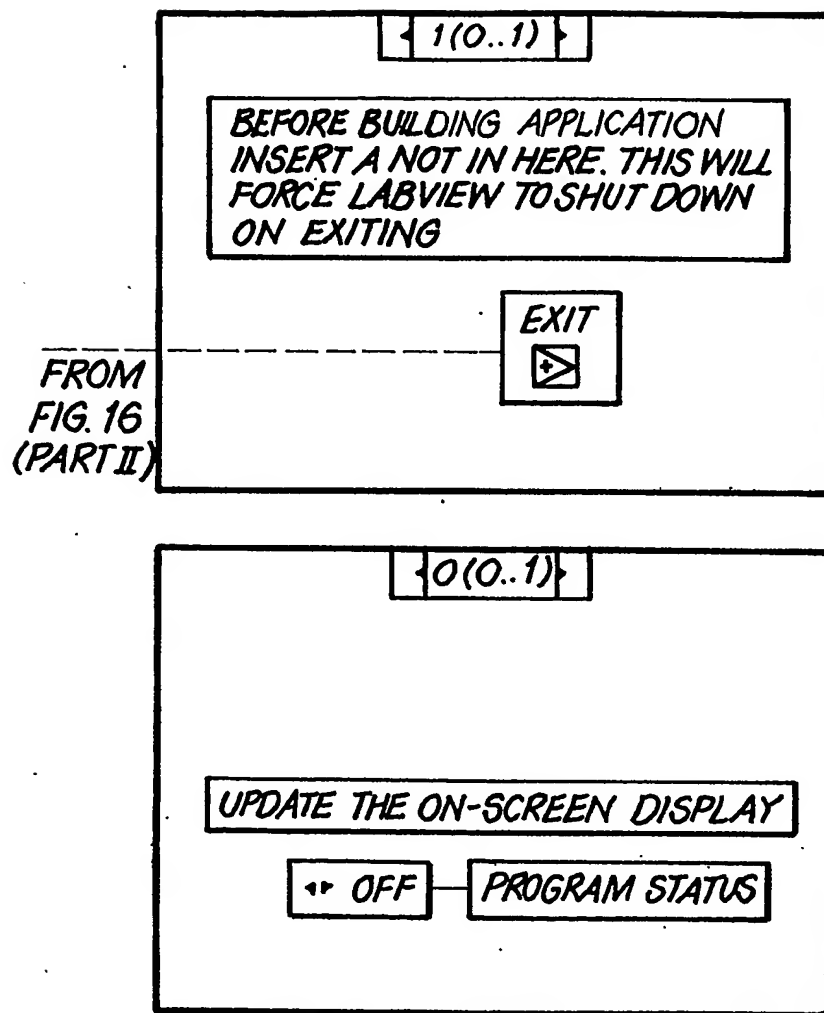


FIG. 16
(PART III)

19/53

↓ FROM FIG. 16 (PART II)

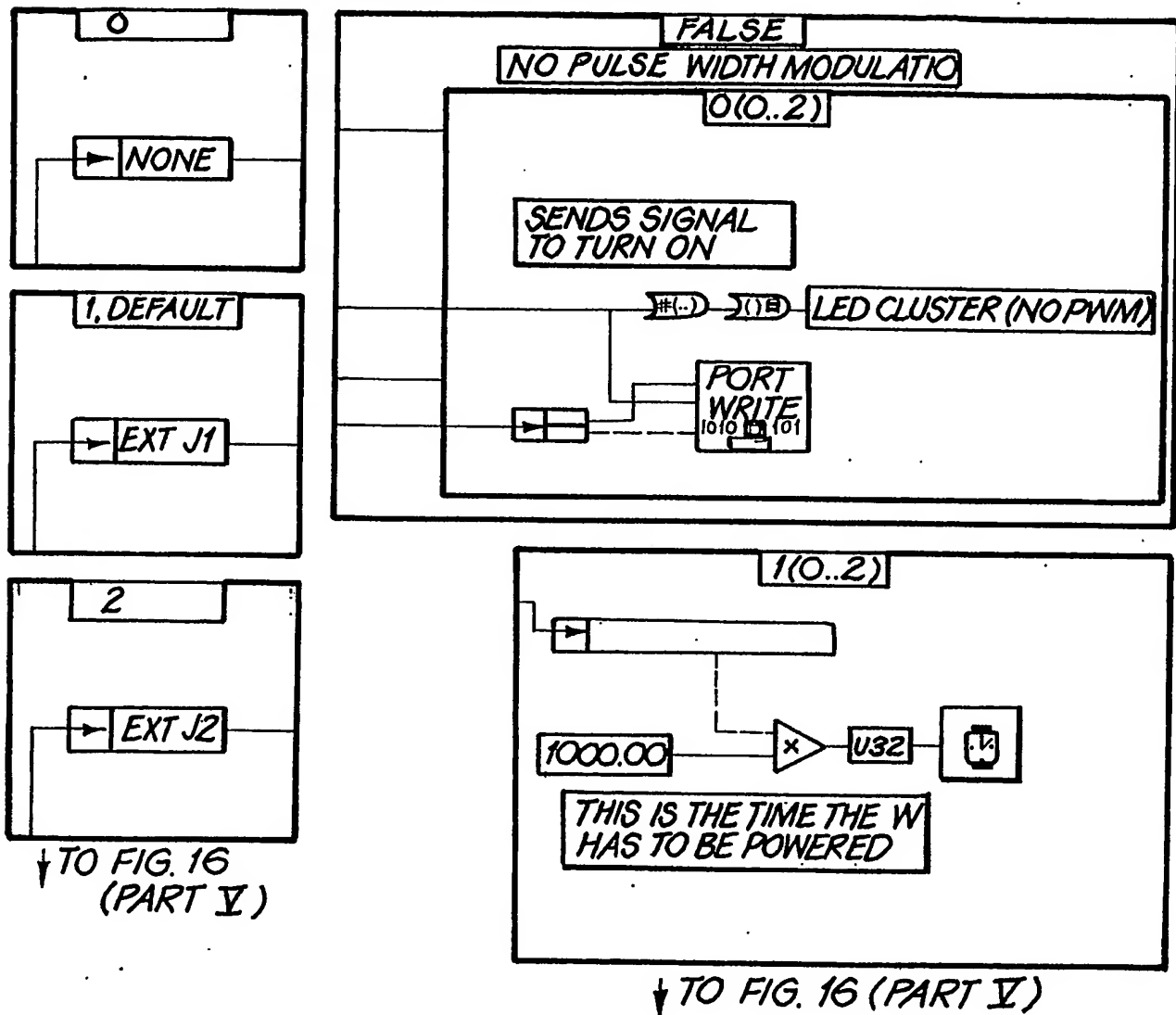
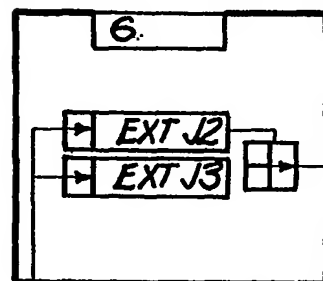
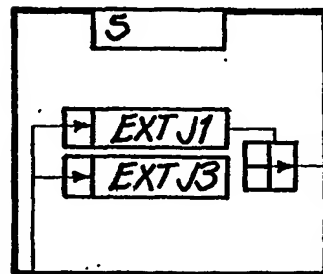
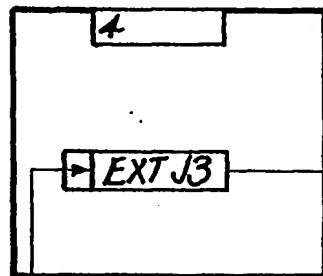
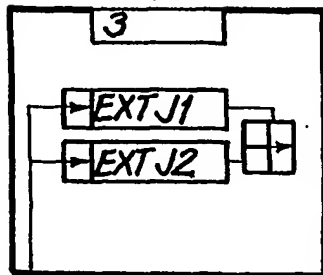


FIG. 16
(PART IV)

↓ FROM FIG. 16 (PART IV)



↓ FROM FIG. 16 (PART IV)

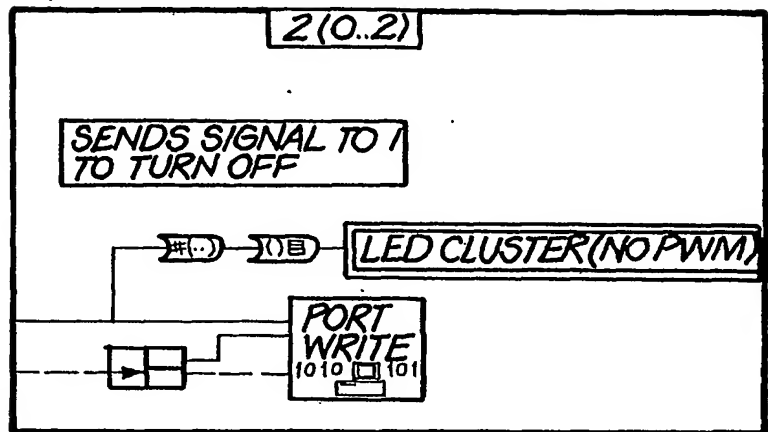


FIG. 16
(PART V)

21/53

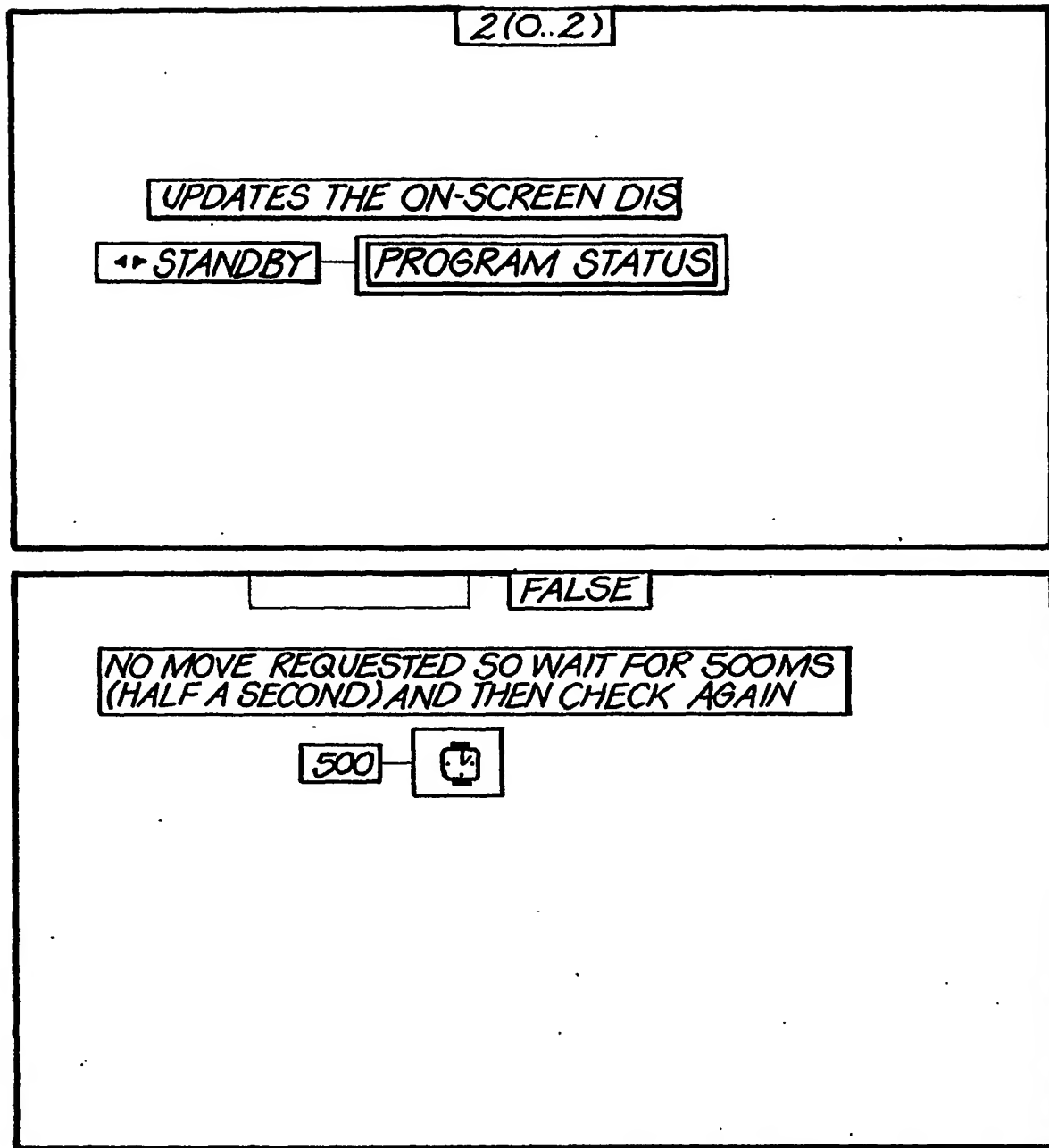
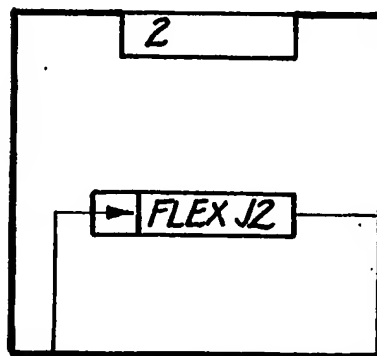
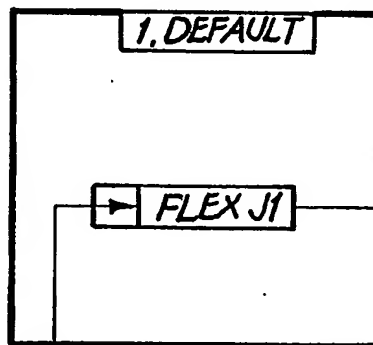
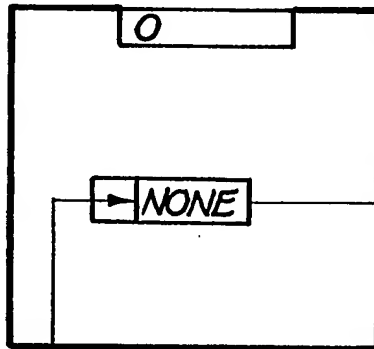
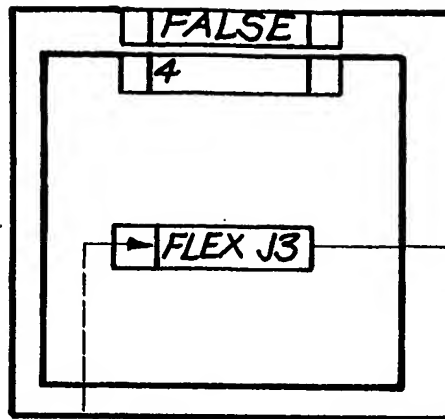


FIG. 17

22/53

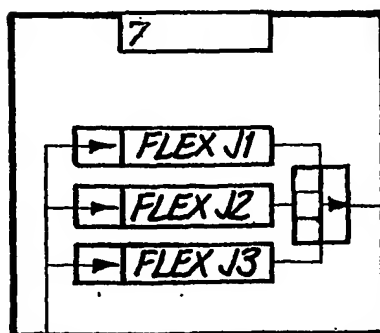
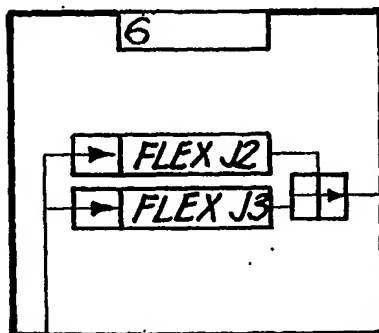
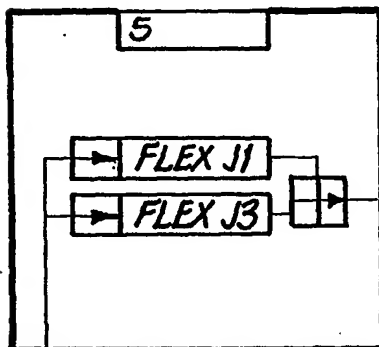
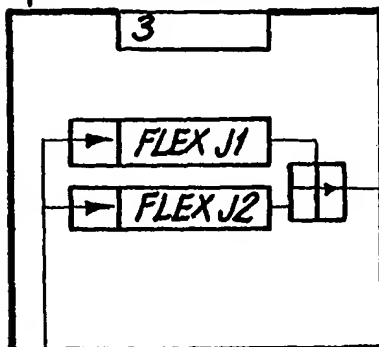


↓ TO FIG. 18 (PART II)

FIG. 18
(PART I)

23/53

↓ FROM FIG. 18 (PART I)



↓ TO FIG. 18 (PART III)

FIG. 18
(PART II)

24/53

↓ FROM FIG. 18 (PART II)

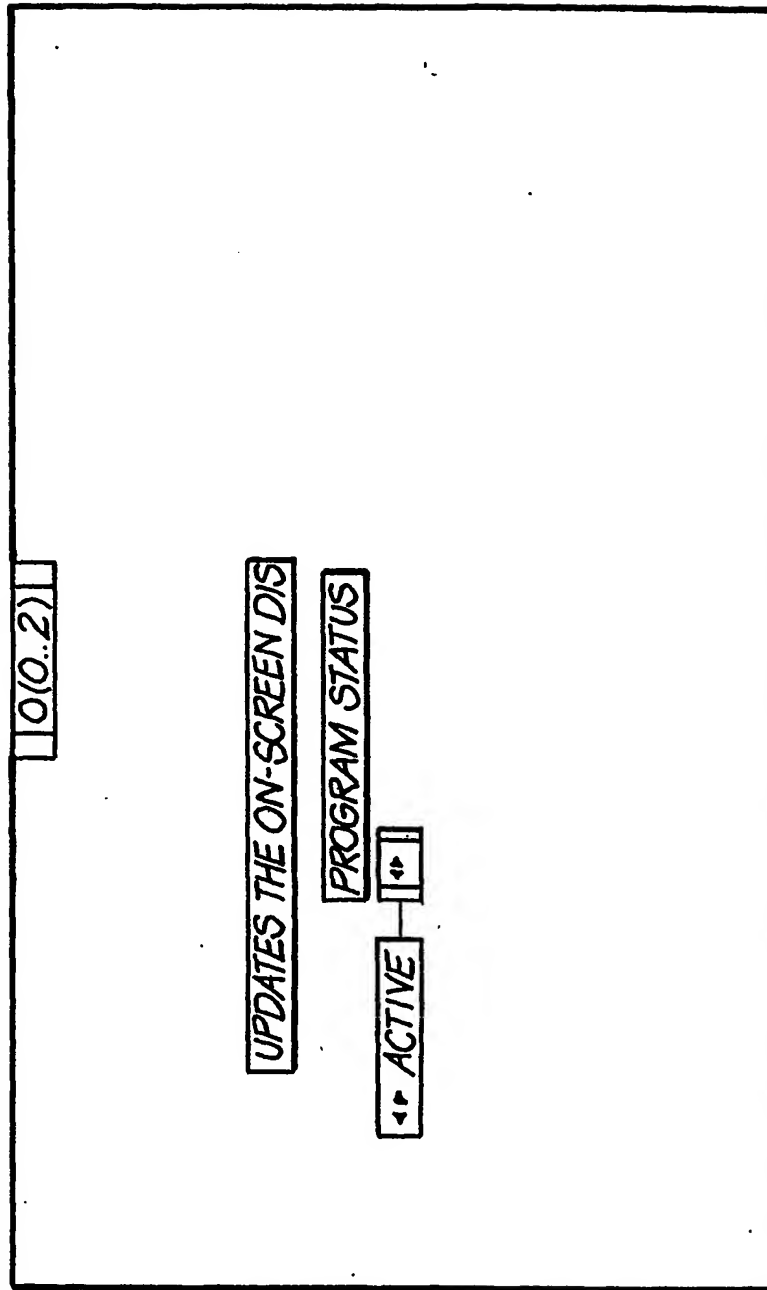


FIG. 18
(PART III)

25/53

TIME / PER SEC / DUTY CYCLE

TIME TO HOLD (SECS)
 ▲ ▼

CYCLES PER SECOND
 ▼

% ON
 ▲ ▼

TO SHOW POWER STATE

☐

OFF

ON

LINE PATTERNS

ON PATTERN ▲ ▼

OFF PATTERN ▲ ▼

TASK ID / ERROR CLUSTER

TASK ID
 ▲ ▼

ERROR OUT

NO ERROR ▲ ▼

SOURCE

FLOOR (x,y)

LED CLUSTER

EXTENSORS	OFF	6	OFF	4	OFF	2	OFF	0
FLEXORS	OFF	7	OFF	5	OFF	3	OFF	1

FIG. 19

26/53

TIME / PER SEC / DUTY CYCLE

TIME TO HOLD (SECS)
 ⬆ 2.0

CYCLES PER SECOND
 10 ▼

% ON
 ⬆ 50

TO SHOW POWER STATE

OFF
 0

ON
 0

LINE PATTERNS

ON PATTERN ⬆ x 0

OFF PATTERN ⬆ x 0

TASK ID / ERROR CLUSTER

TASK ID
 ⬆ x 0

ERROR OUT

NO ERROR

CODE
0

SOURCE

FLOOR (x,y) x-y

0

0

LED CLUSTER

EXTENSORS	OFF	6	OFF	4	OFF	2	OFF	0
FLEXORS	OFF	7	OFF	5	OFF	3	OFF	1

FIG. 20

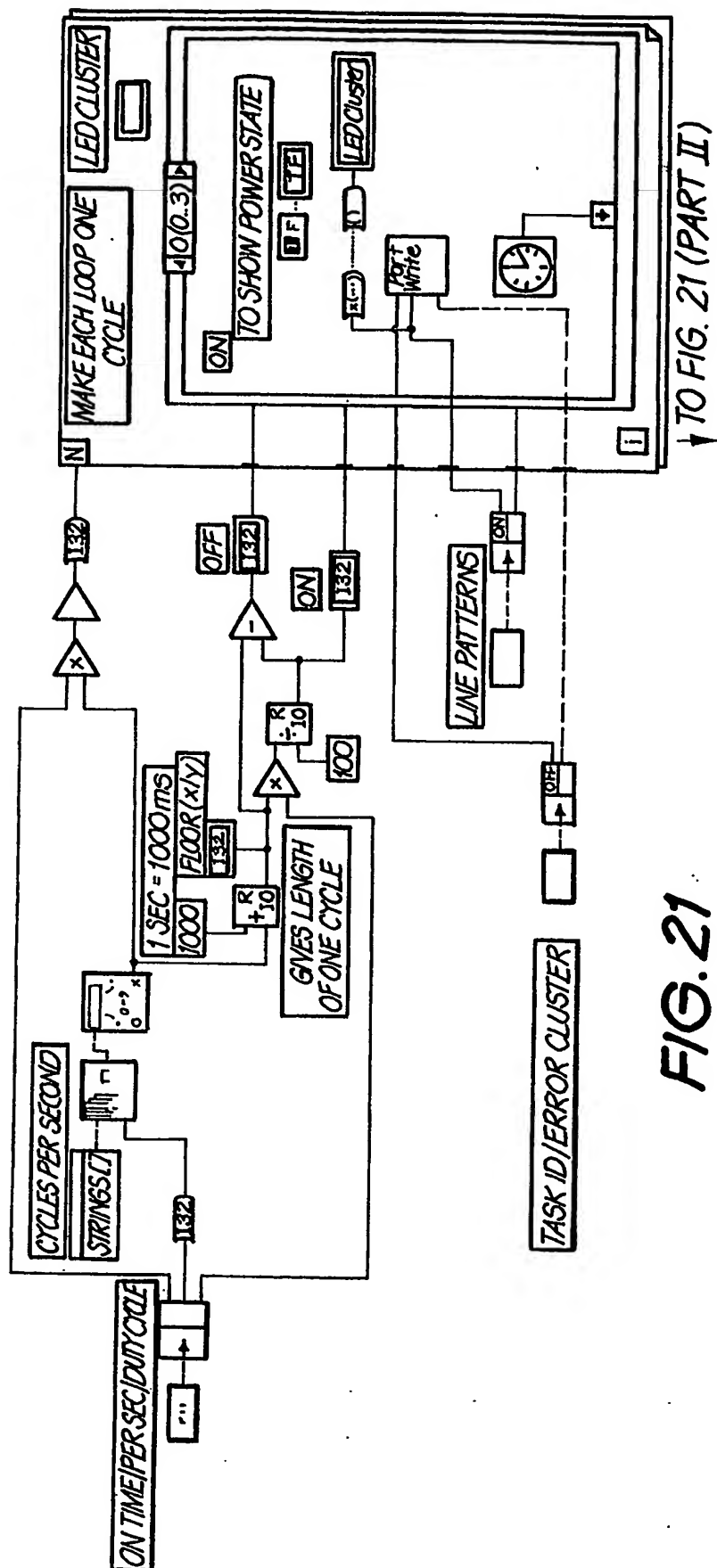


FIG. 21
(PART I)

28/53

↓ FROM FIG. 21 (PART I)

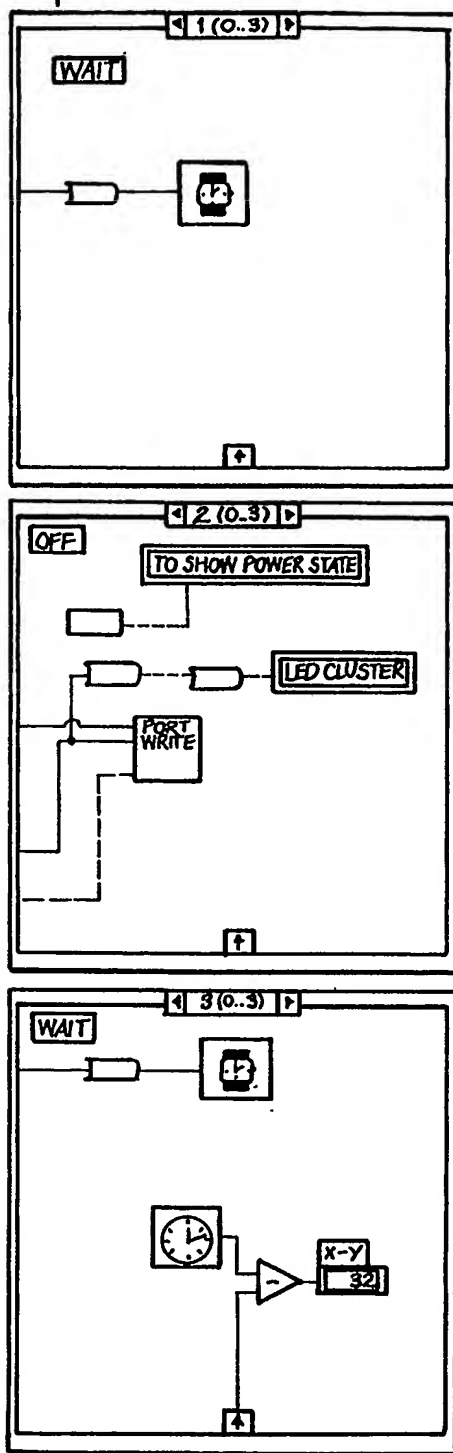


FIG. 21
(PART II)

29/53

**DEVICE 5 IS PCI-MIO-16XE-50
ON POWERMAC 9500 AND
DAQCARD-A1-16E-4 ON
POWERBOOK G3 REMEMBER
TO CHANGE THIS IF USING
THE PCI-DIO-96 ON ANOTHER
COMPUTER**

DIGITAL OUTPUT

DEVICE

DIGITAL CHANNEL

**PCI-MIO-16XE-50 HAS ONE
DIO PORT OF 8 LINES. THIS PORT
IS REFERRED TO AS CHANNEL 0.**

**HIT WHITE ARROW TO START &
EXIT AT ANY TIME TO FINISH**

PROGRAM STATUS

OFF

CURRENT FINGER POSITION

Flexion

WHICH WAY TO MOVE?

EXTENSION ON

FLEXION ON

ORDER OF MOVEMENT

PROXIMAL
→ DISTAL

DISTAL
→ PROXIMAL

WHICH JOINTS TO

☒ 1

☐ 2

☐ 3

PULSE WIDTH MODULATION
☒ OFF ☐ ON

ON TIME / PER SEC / DUTY CYCLE

TIME TO POWER

CYCLES PER SECOND

% ON

LED CLUSTER (NO PWM)

EXTENSORS ☐ 6 ☐ 4 ☐ 2 ☐ 0

FLEXORS ☐ 7 ☐ 5 ☐ 3 ☐ 1

**ACTIVATION SEQUENCE 1&12 WIRES
ON FOR HALF TIME TO POWER, THEN
ONLY 12 WIRES ON FOR 2ND HALF**

FIG. 22

30/53

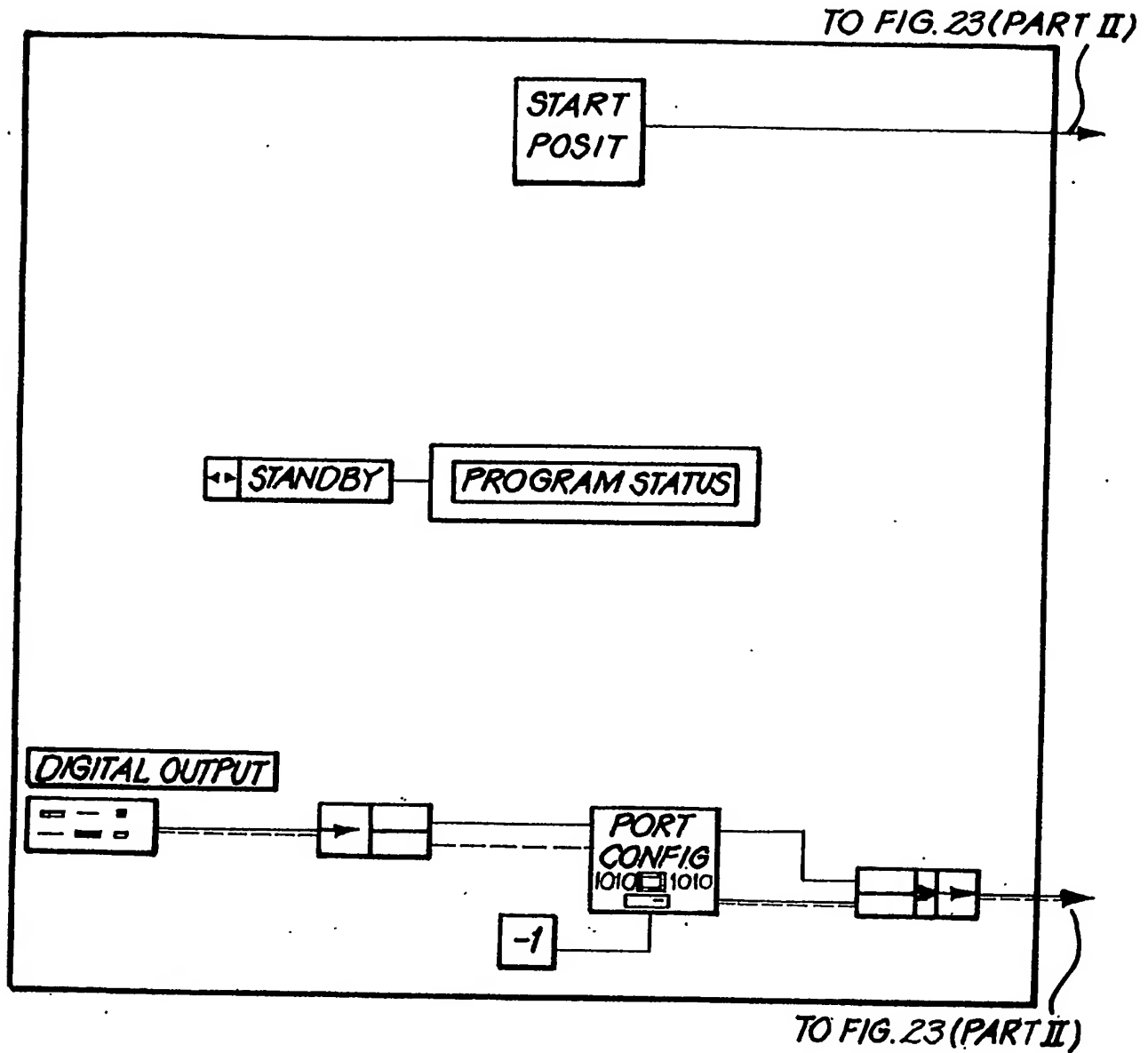
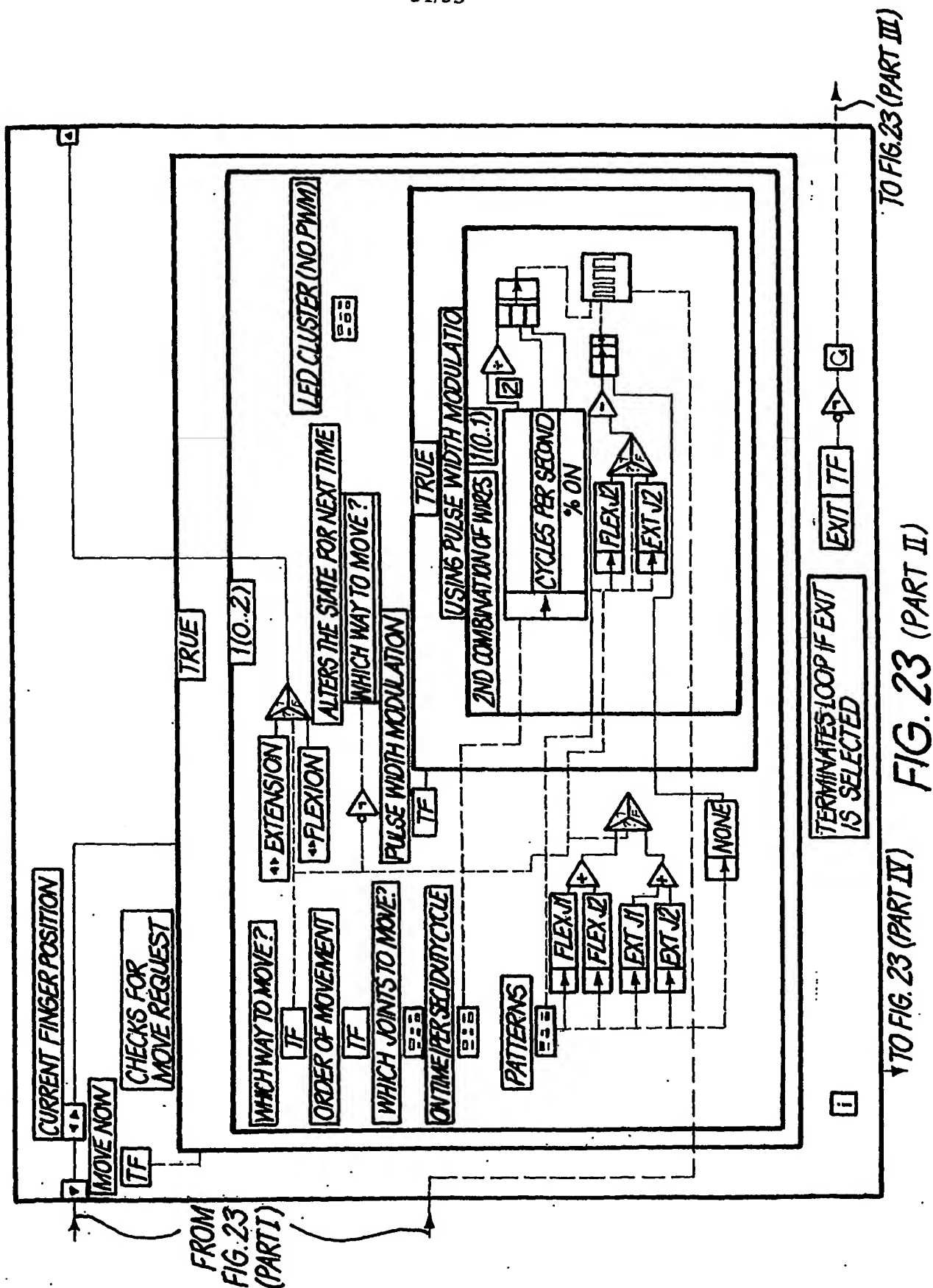


FIG. 23
(PART I)



32/53

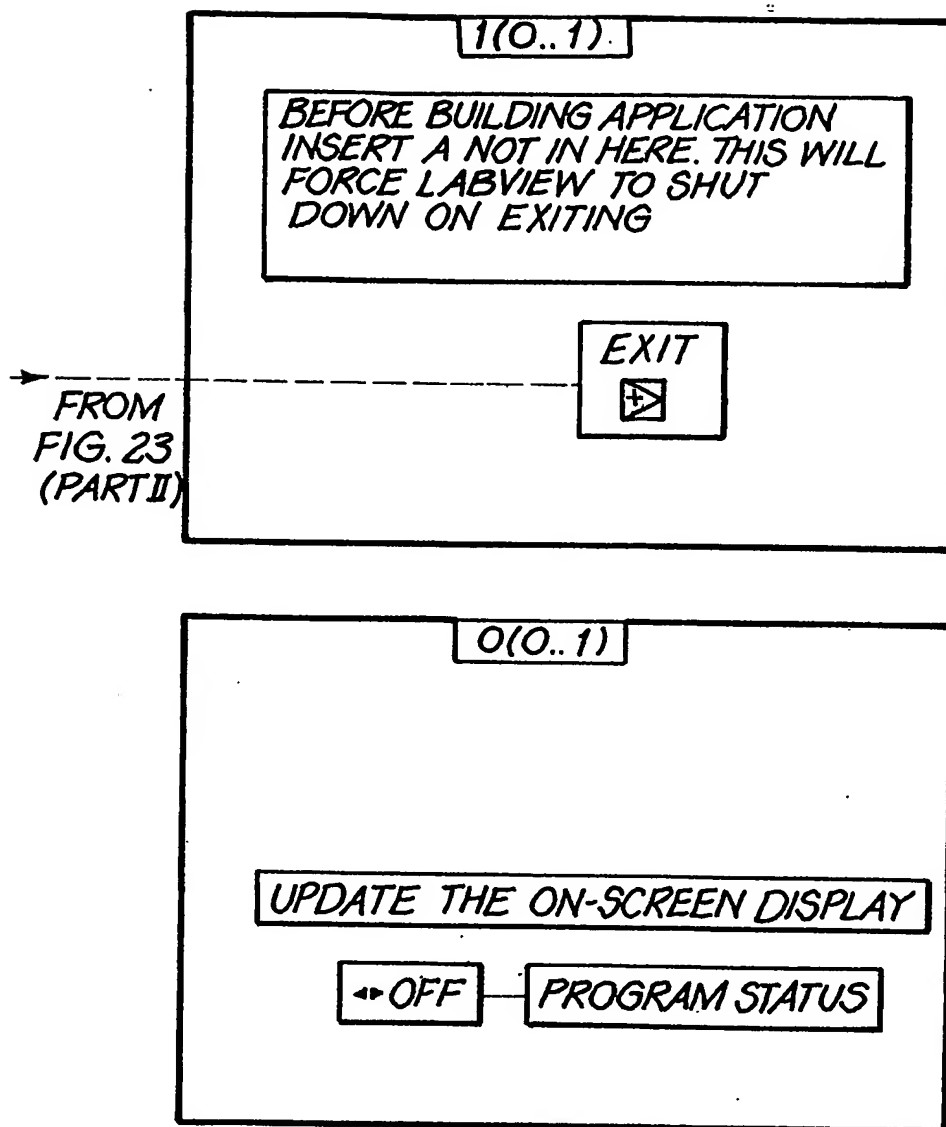


FIG. 23
(PART III)

33/53

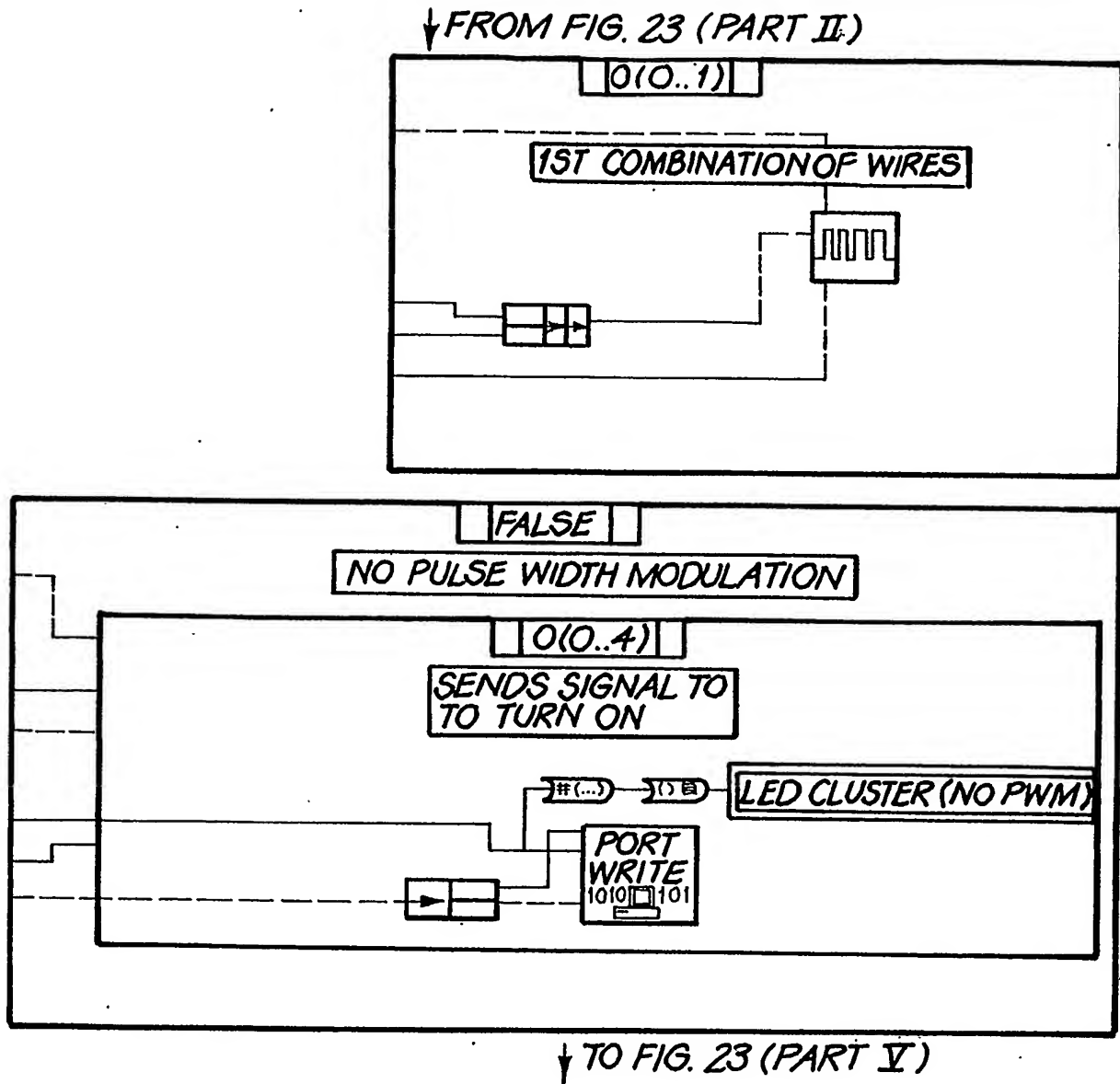


FIG. 23
(PART IV)

34/53

↓ FROM FIG. 23 (PART IV)

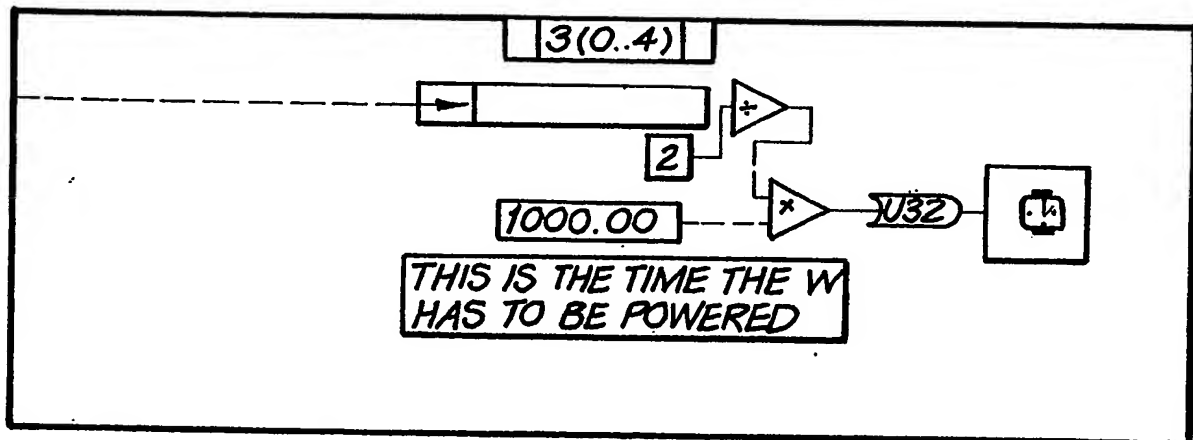
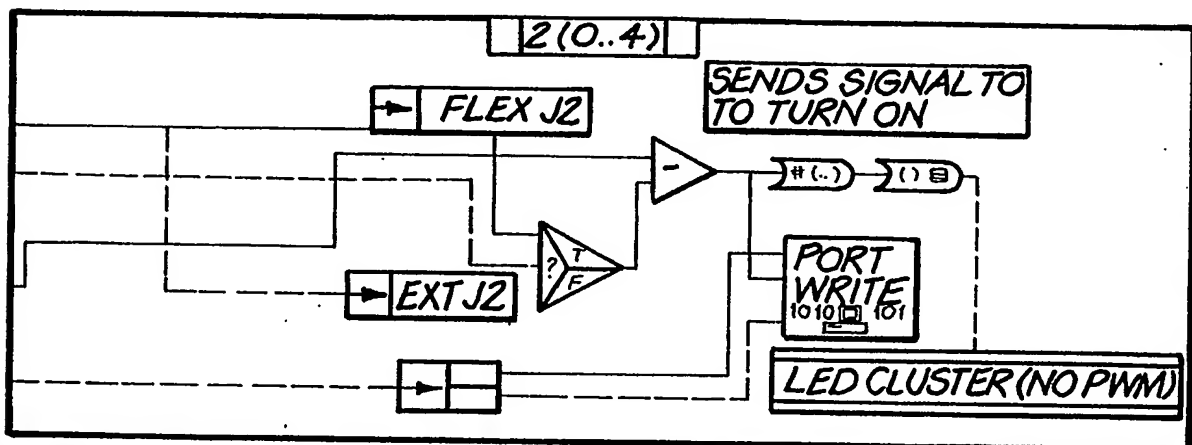
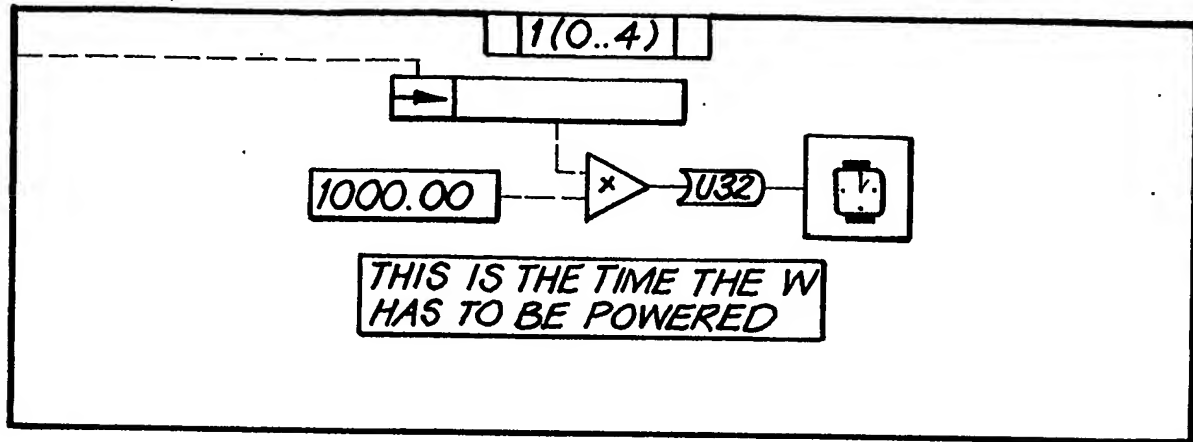


FIG. 23
(PART V)

35/53

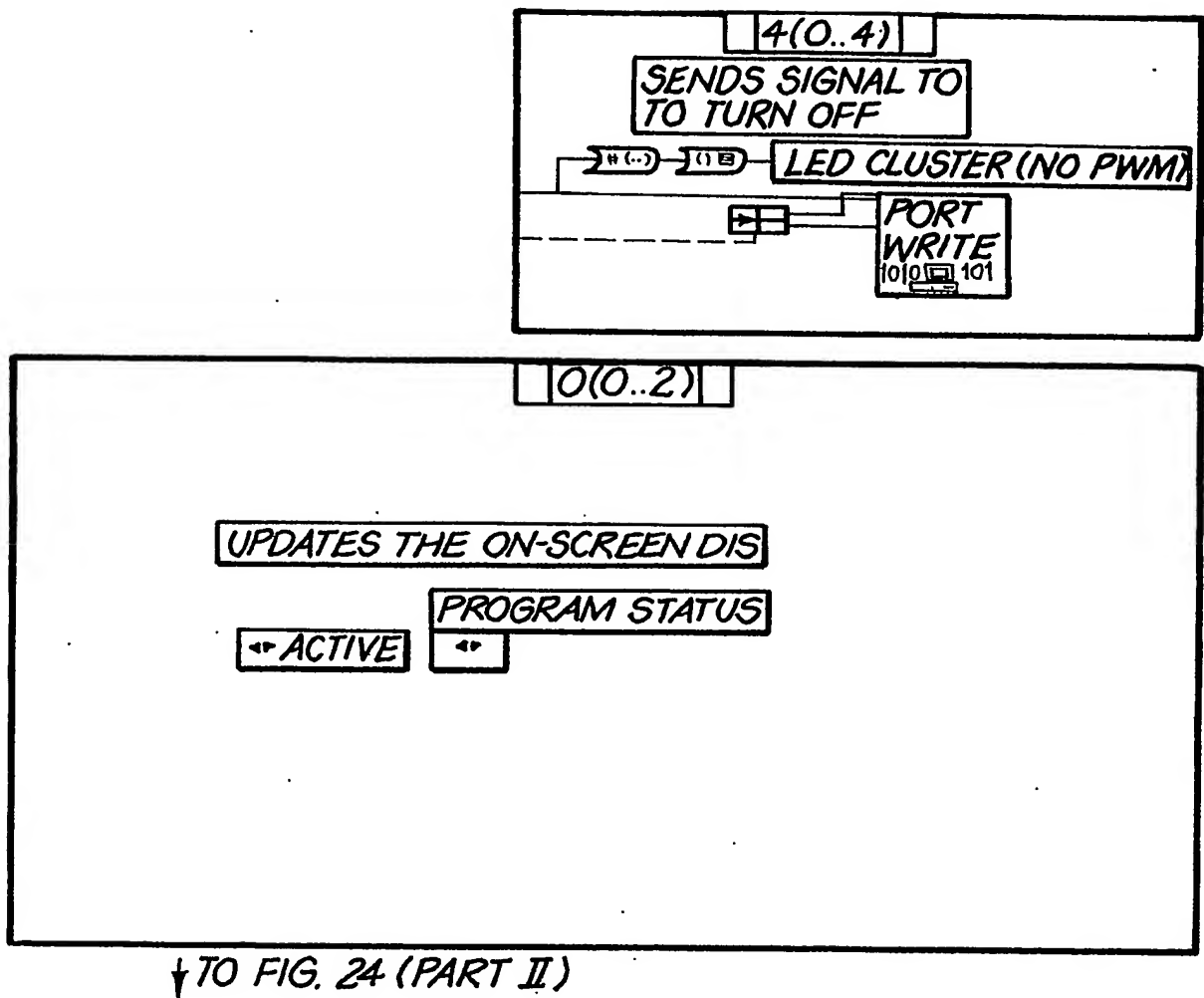


FIG. 24
(PART I)

36/53

↓ FROM FIG. 24 (PART I)

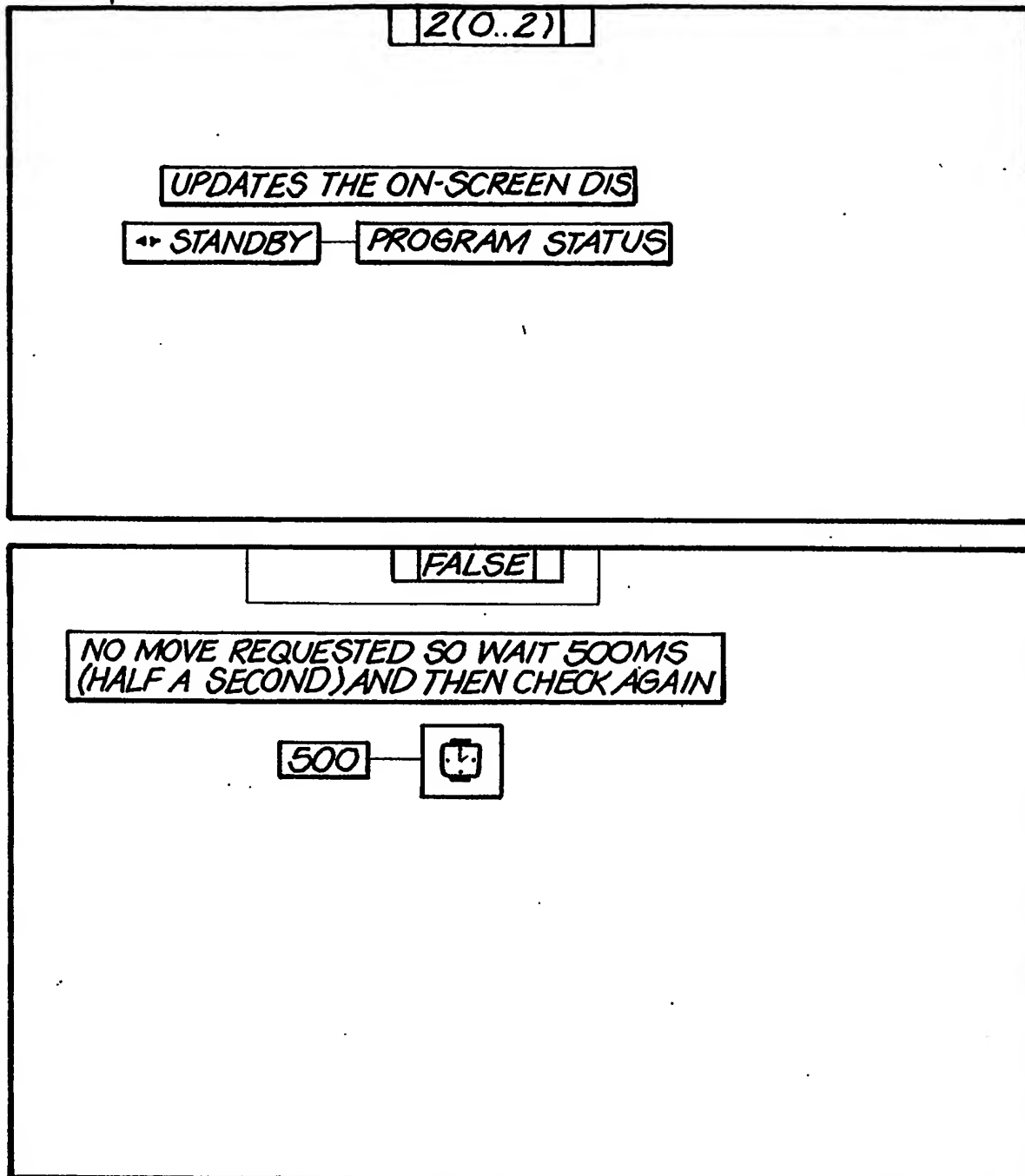
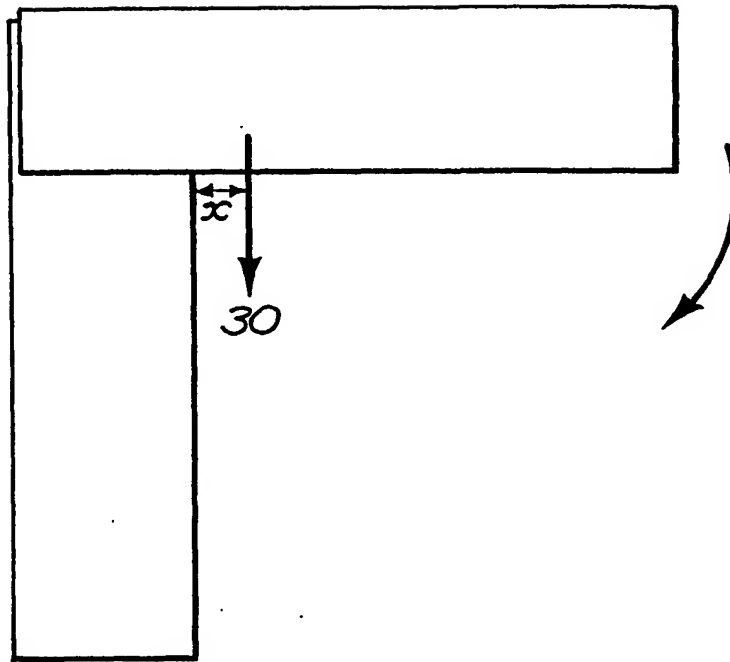


FIG. 24
(PART II)

37/53

*FIG. 25*

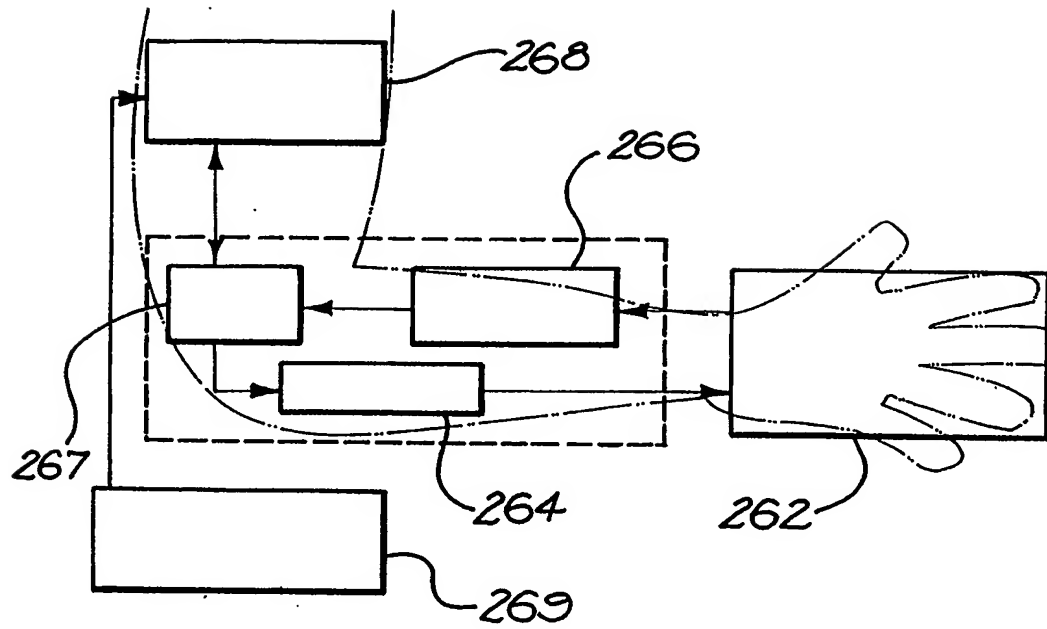


FIG. 26

39/53

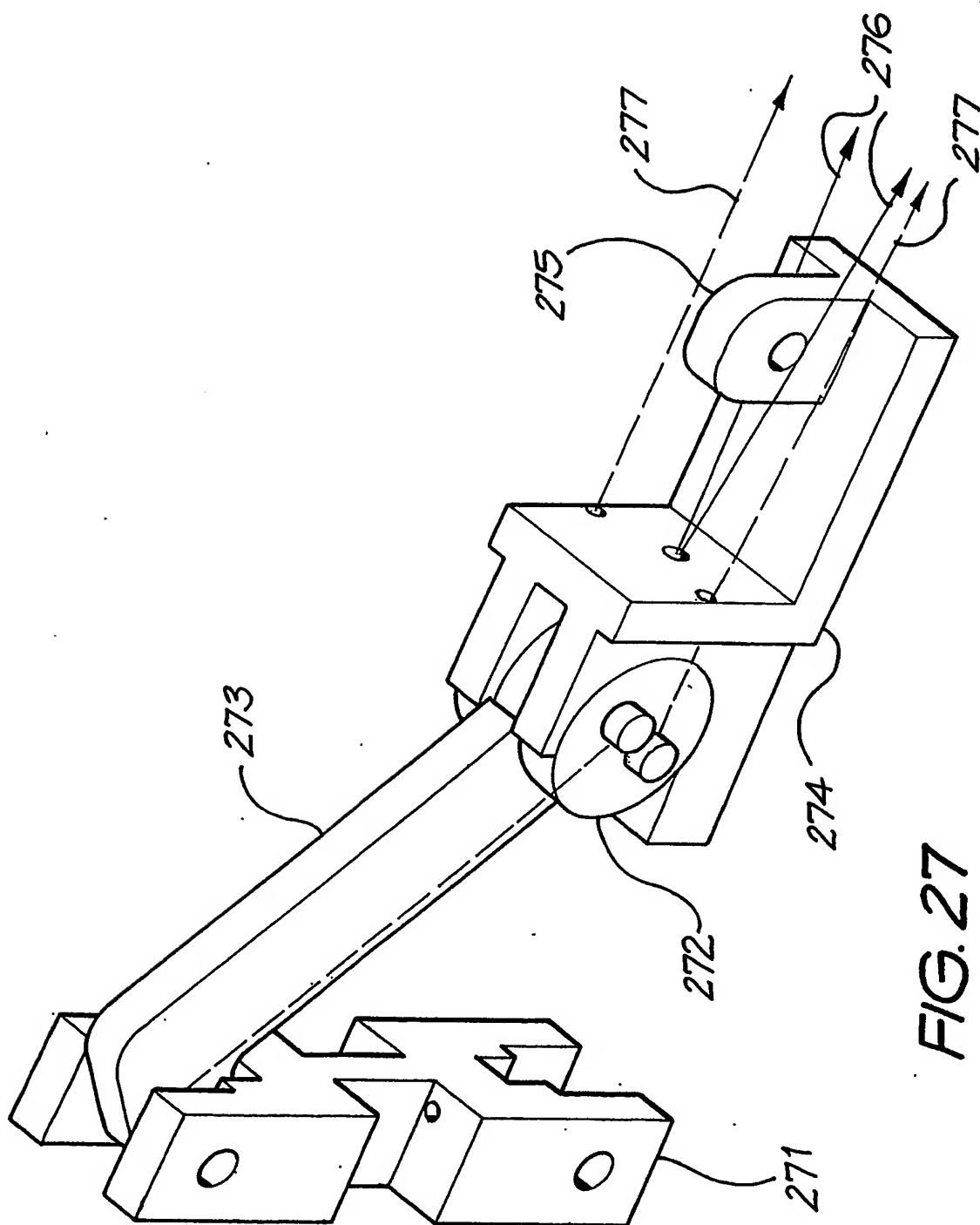


FIG. 27

40/53

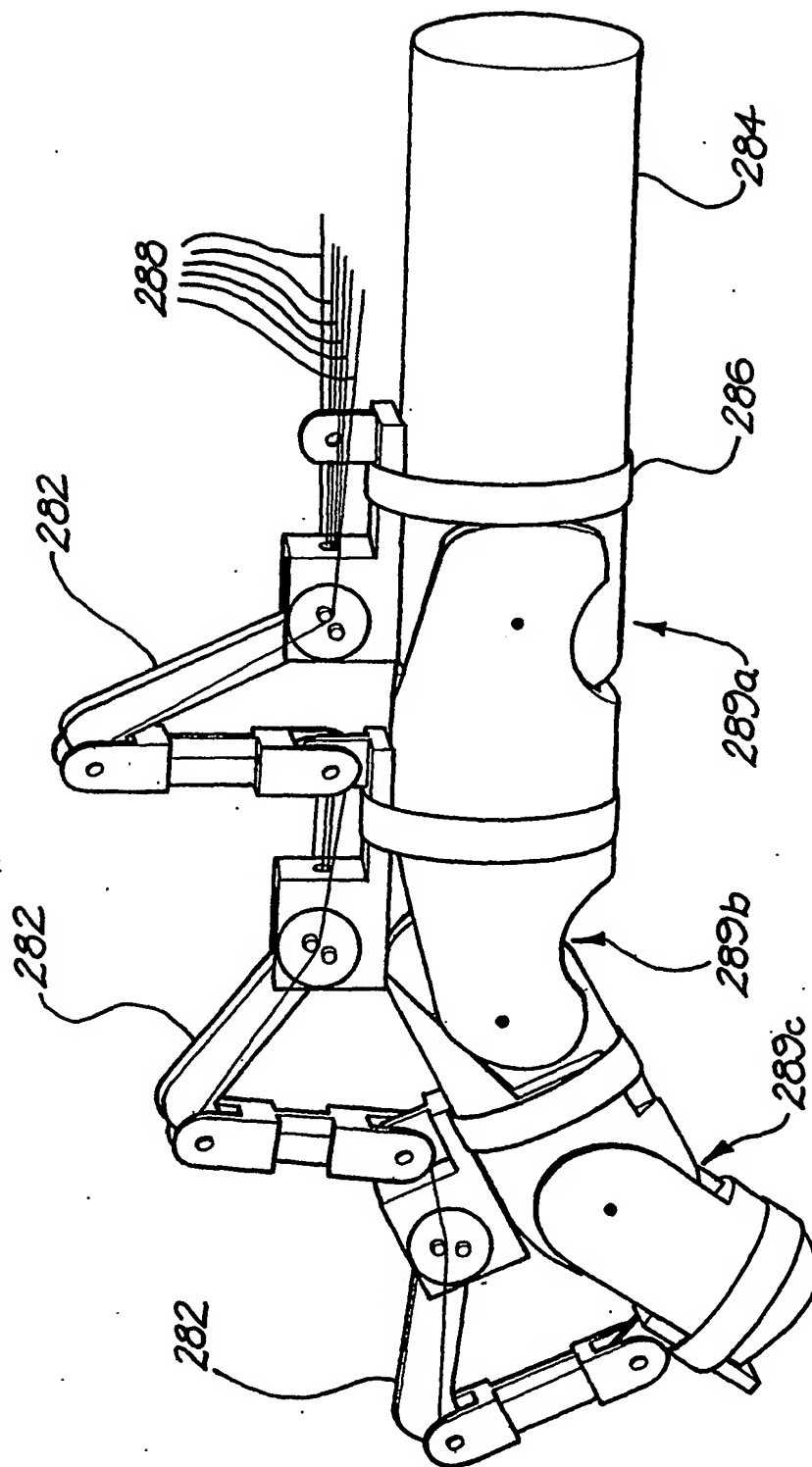
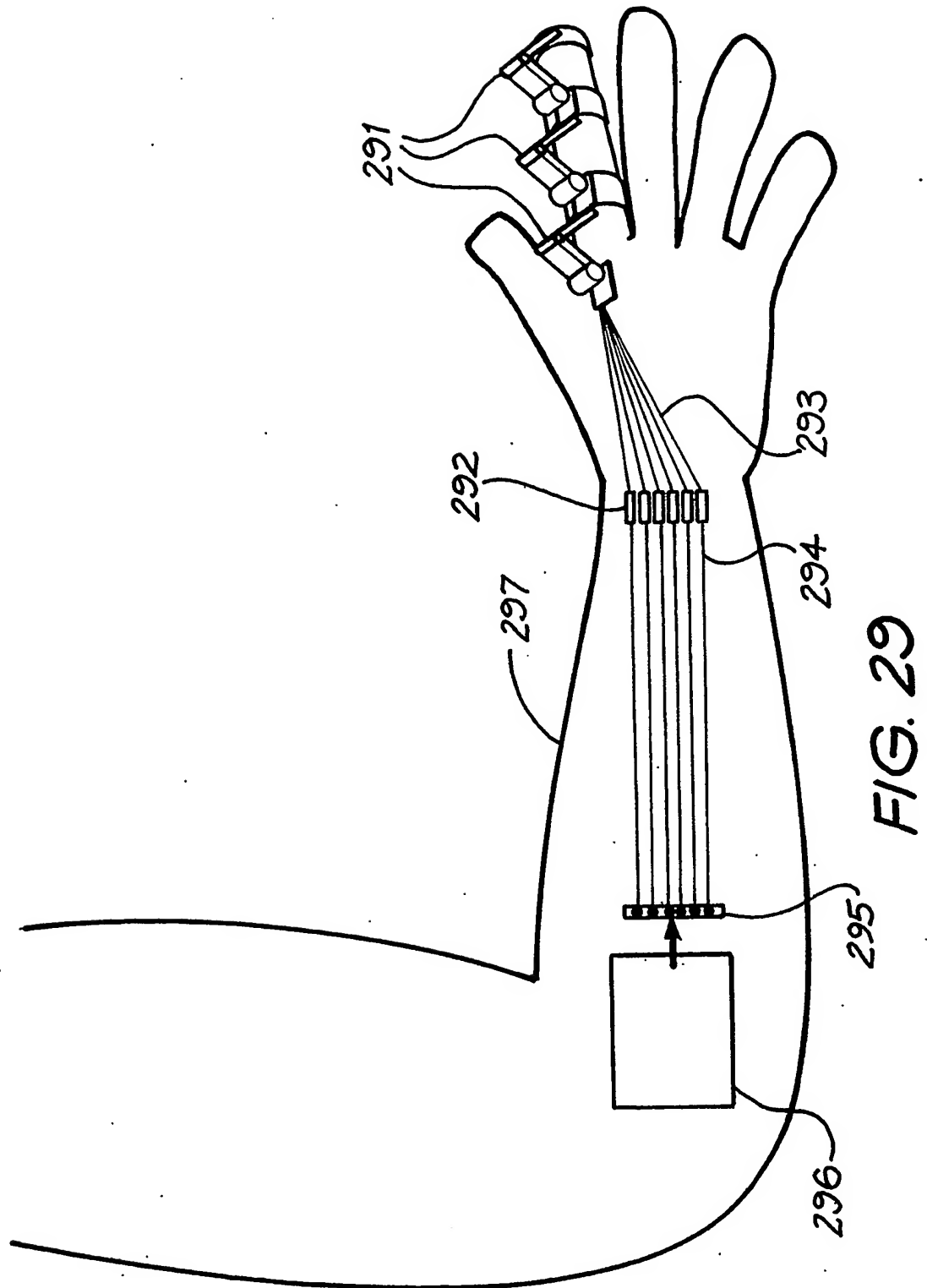


FIG. 28

41/53



42/53

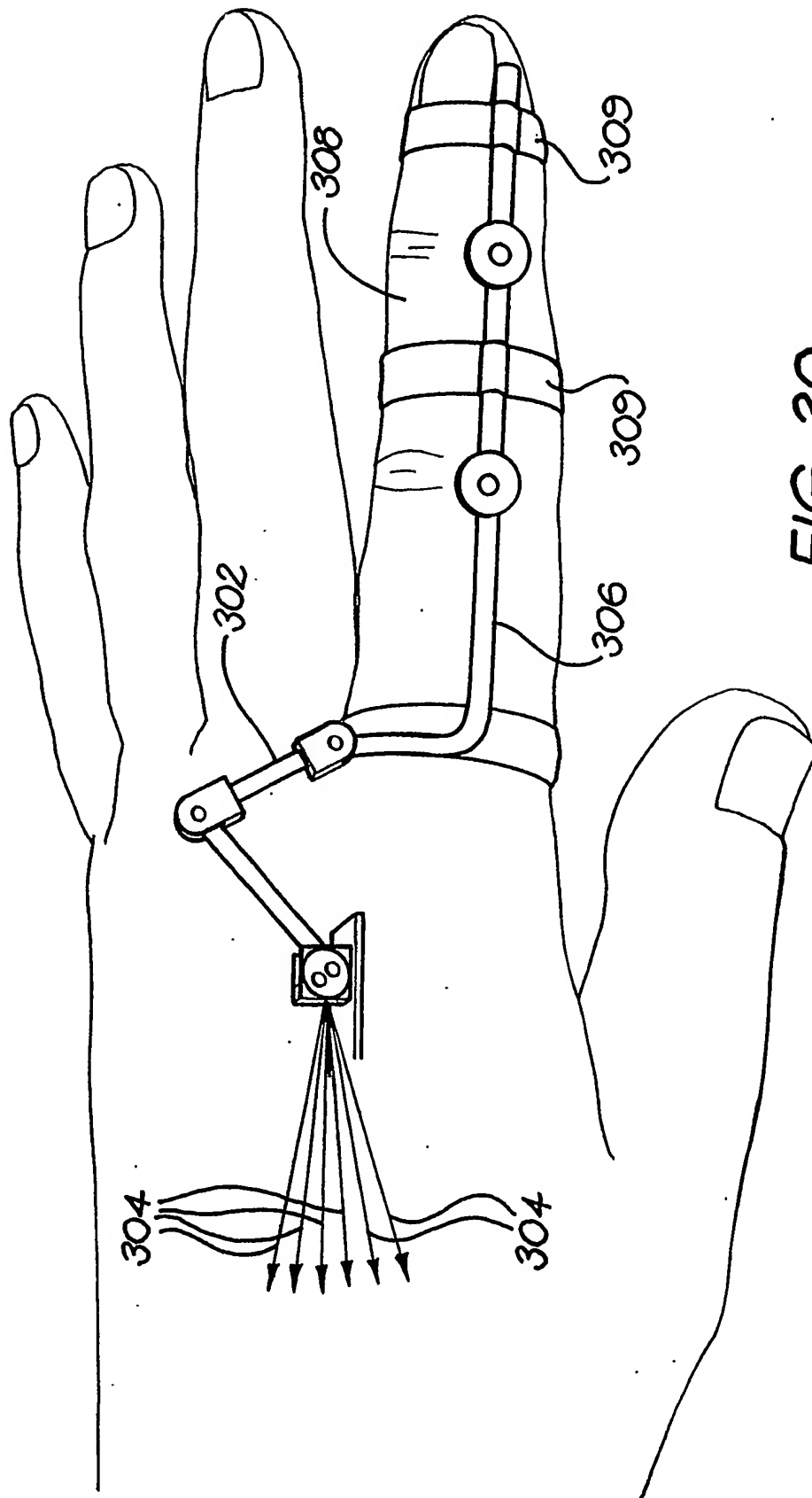


FIG. 30

43/53

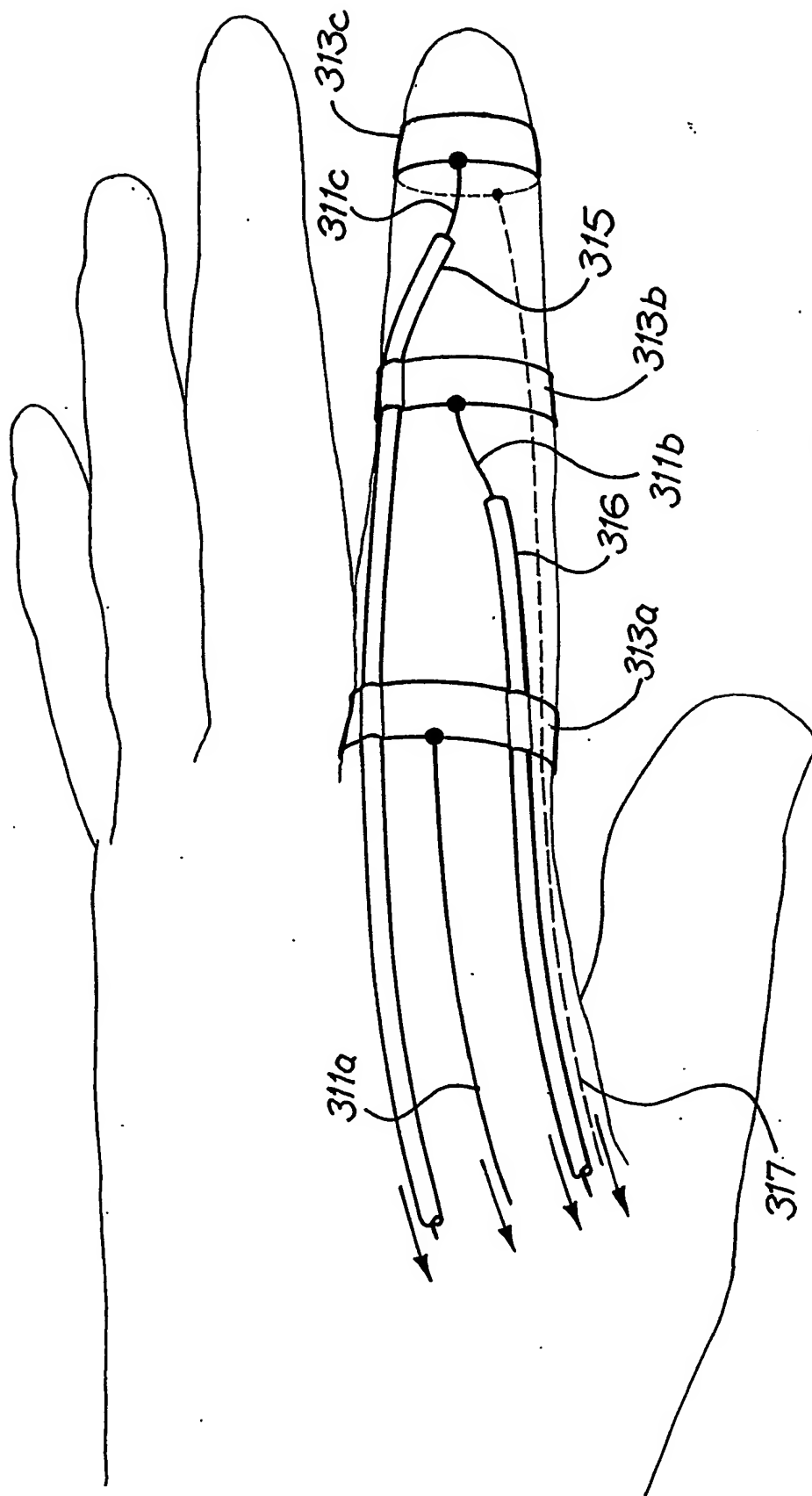


FIG. 31

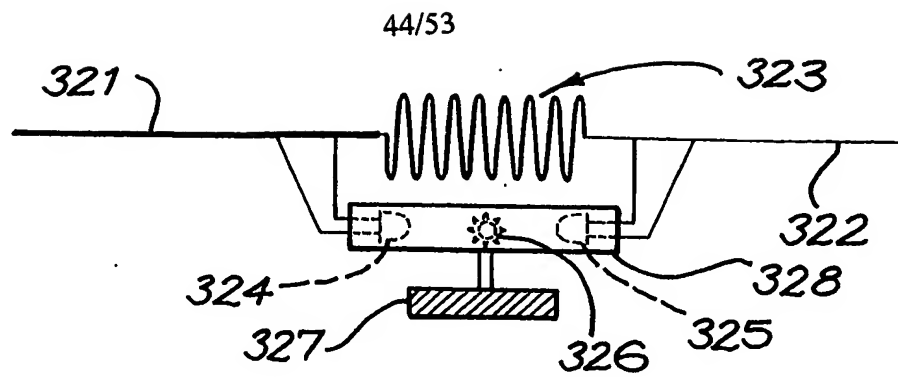


FIG. 32

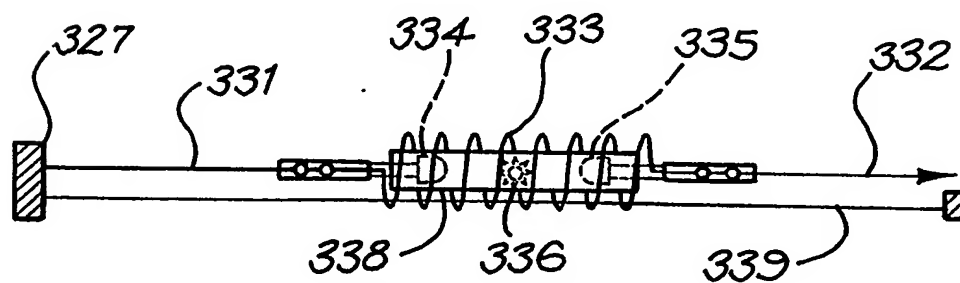


FIG. 33

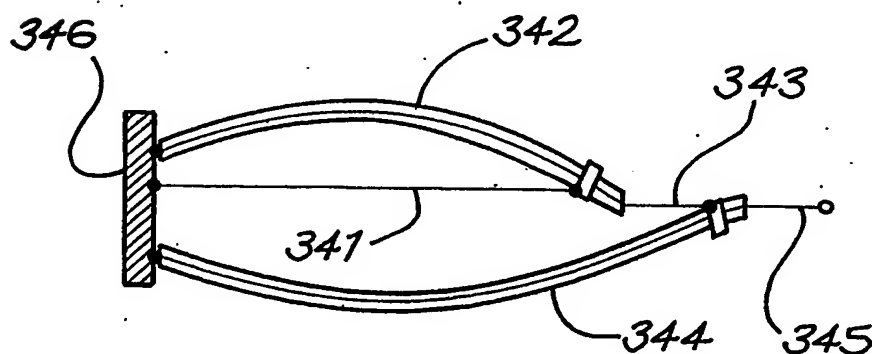


FIG. 34

45/53

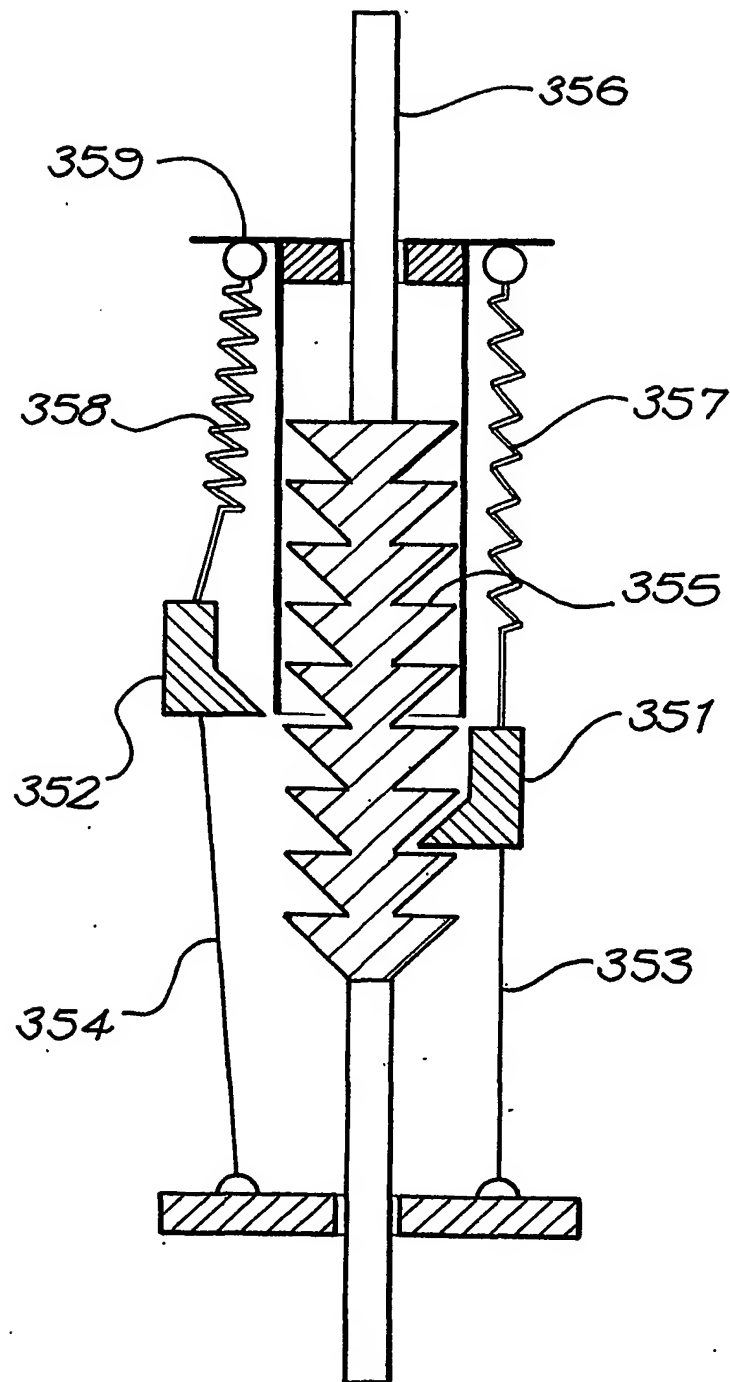


FIG. 35

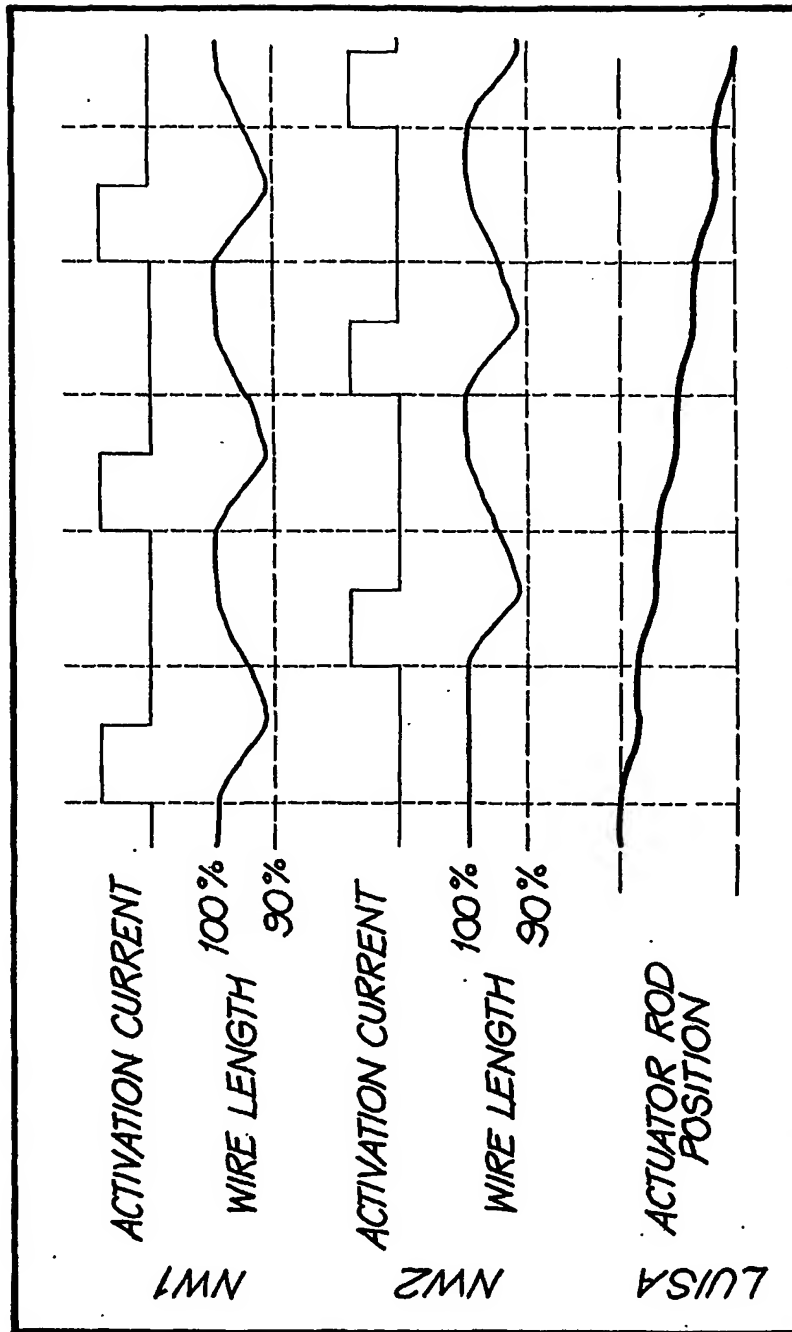


FIG. 36

47/53

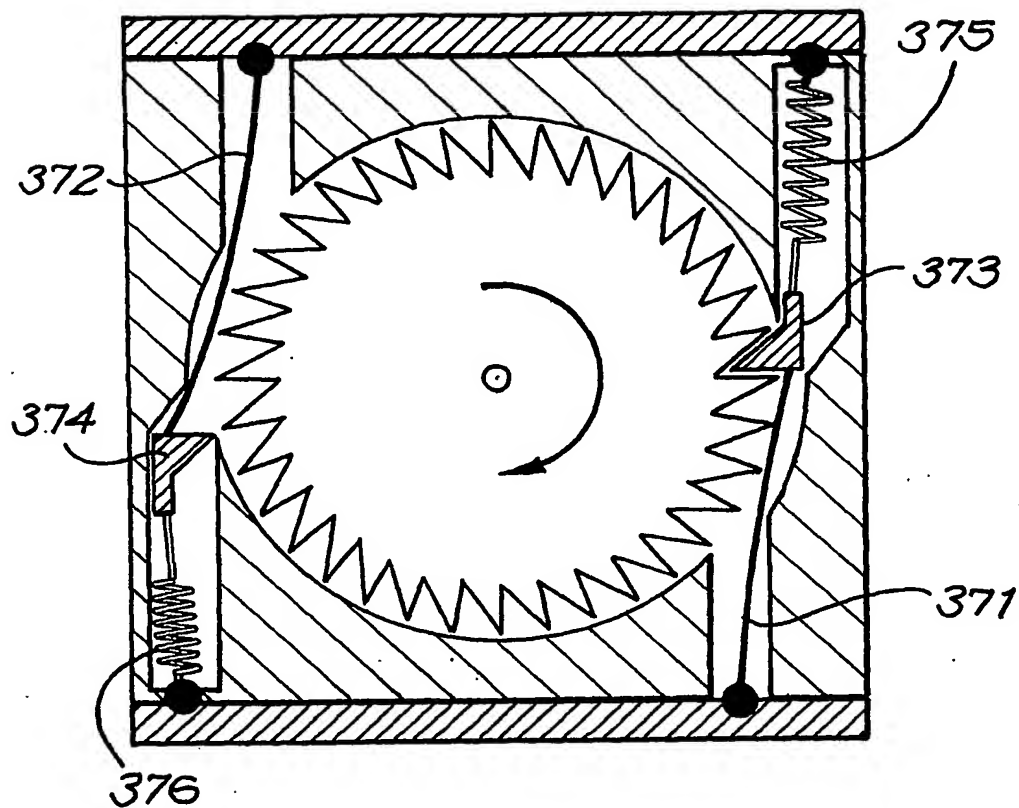


FIG. 37a

48/53

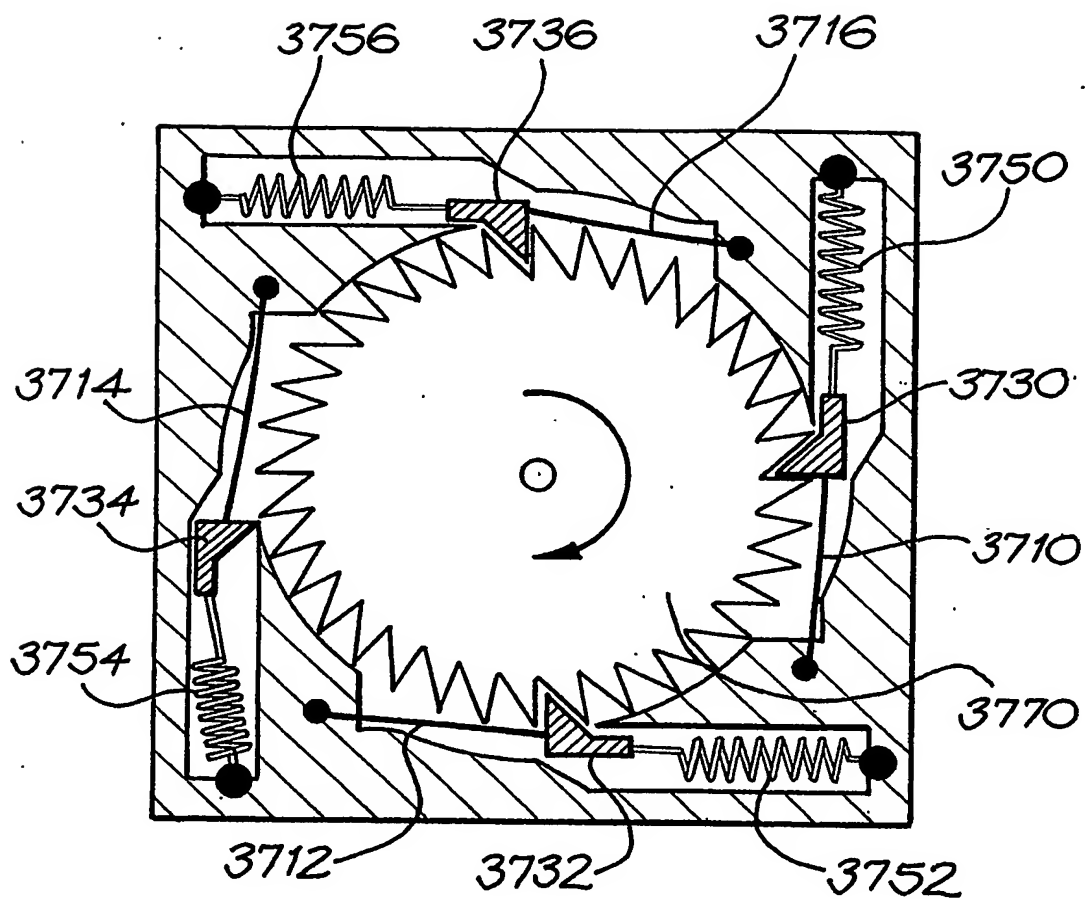
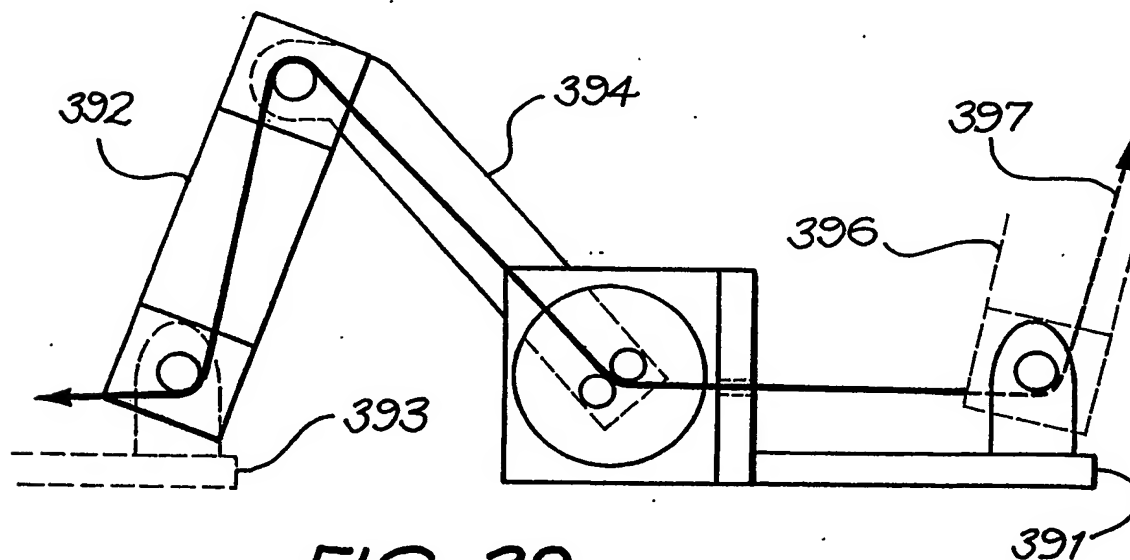
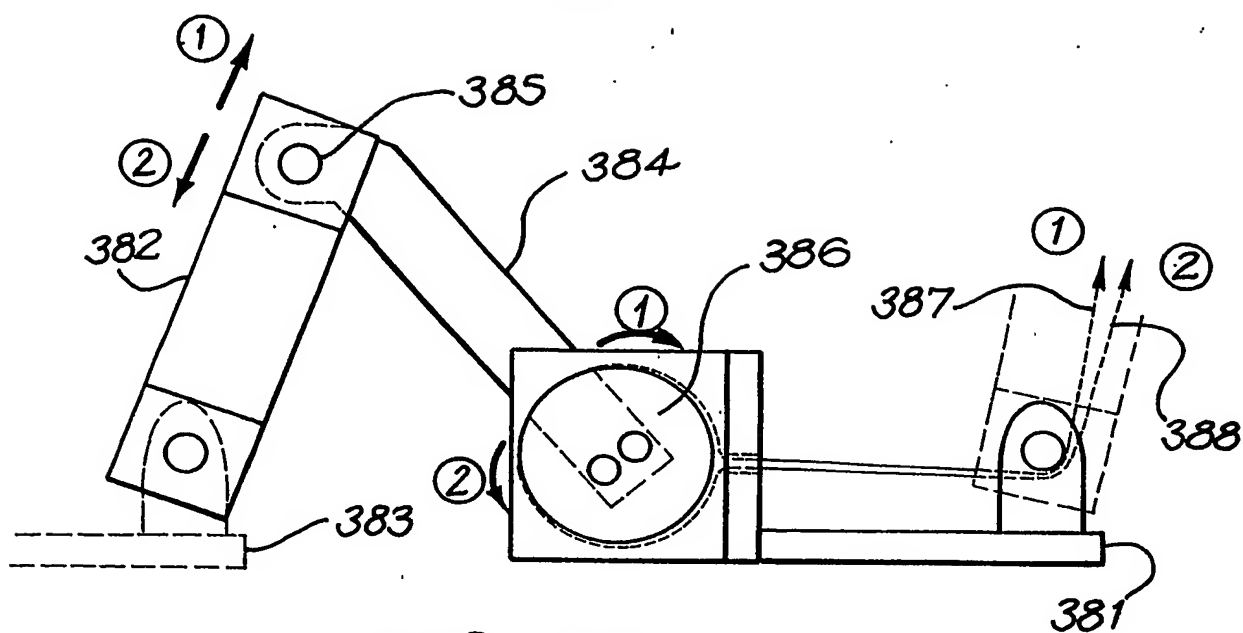
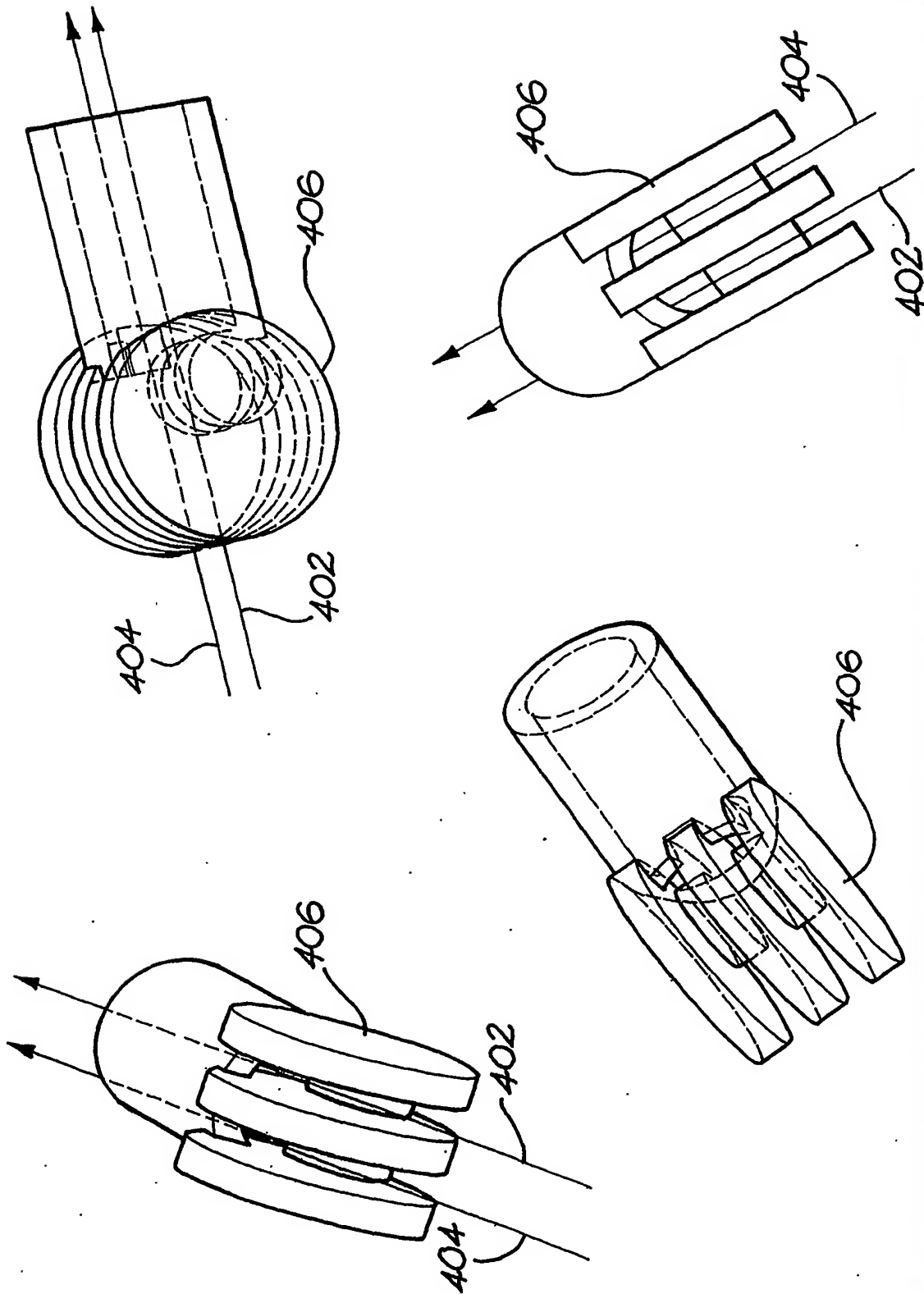


FIG. 37b

49/53



50/53



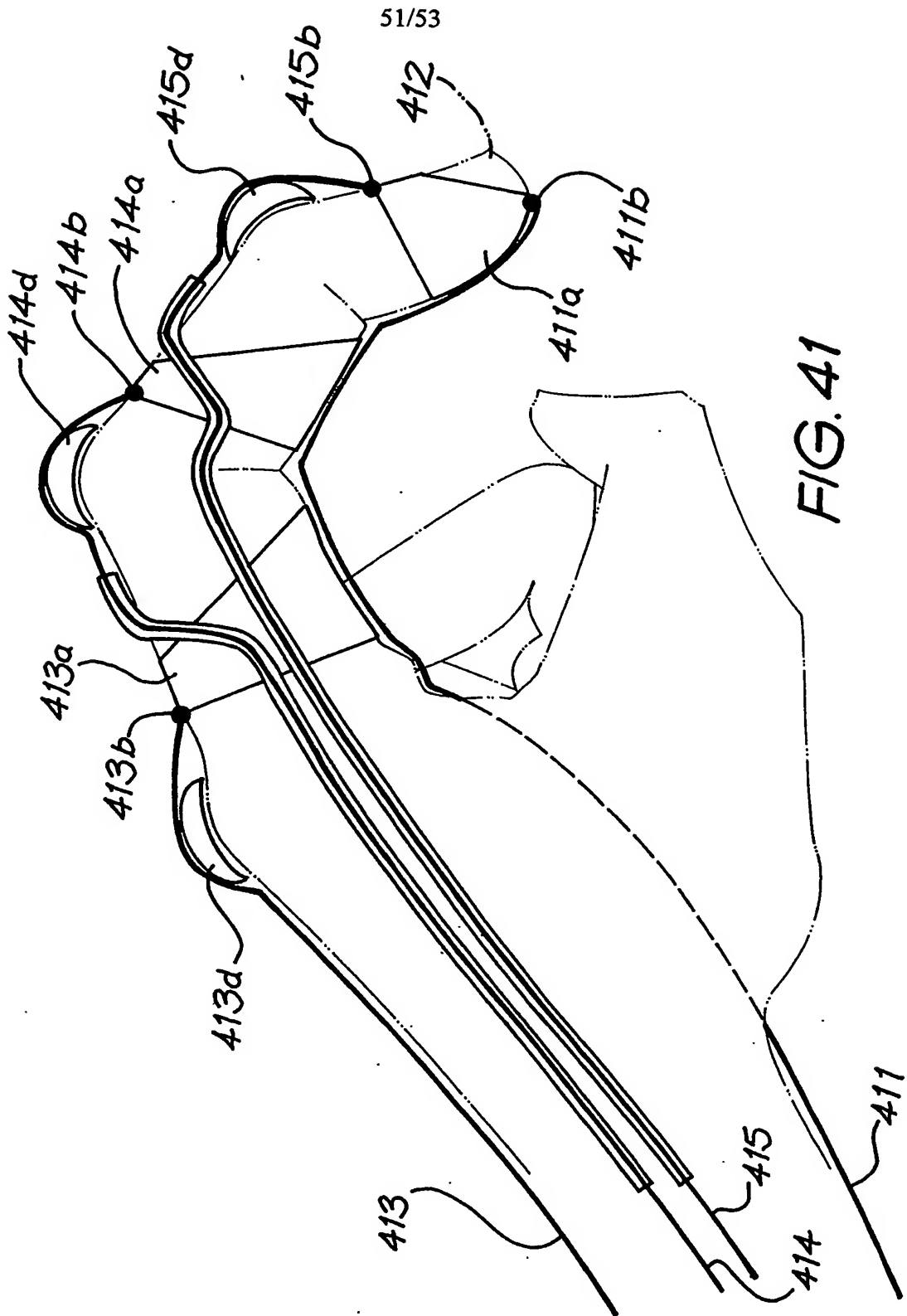


FIG. 41

52/53

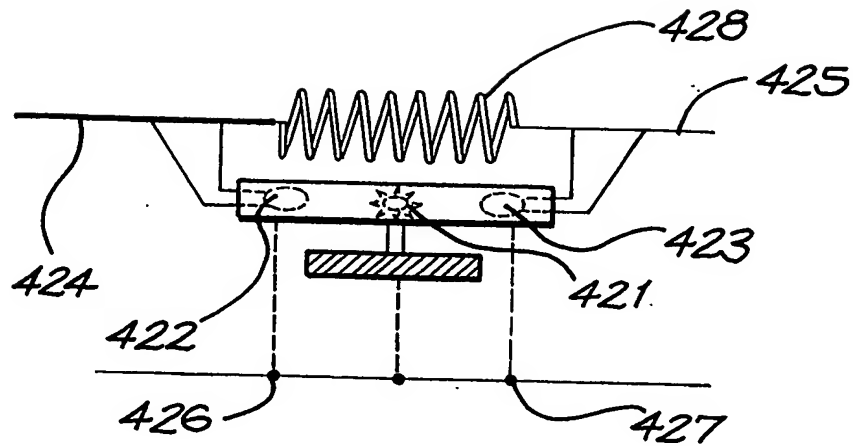


FIG. 42

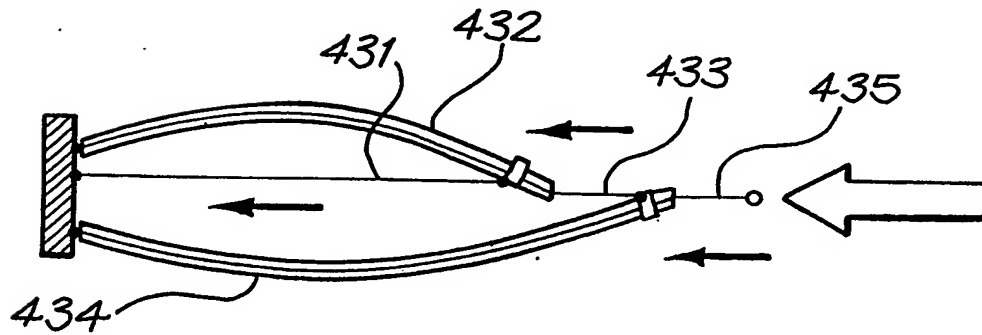


FIG. 43

53/53

